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# LECTURES ON CATARACT

## II. DIFFICULTIES AT THE TIME OF CATARACT OPERATION

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### THE RIGID PUPIL

On attempting to establish preoperative mydriasis, it may be found that the pupil, round and active when selected, will not dilate effectively. Poor dilatation may have been noted at an earlier stage during dark-room examination; but at that time no attempt is made to push mydriatics.

The problem of poor dilatation is prominent in the Orient and must be dealt with on the table. We do not favor preliminary iridectomy—the two-stage procedure—except in certain complicated cataracts. It is the exception rather than the rule with us to get a pupil to dilate more than half, with our best efforts at mydriasis. I will not discuss why the rigid pupil should be more frequent in the deeply pigmented eye; I have done so elsewhere.

Such rigid pupils are sometimes associated with posterior adhesions of the retinal-pigment layer. Not uncommonly we discover these quiet adhesions of the retinal-pigment layer to the capsule at the time of operation, previous inspection of pupil, iris, face, or anterior chamber not having aroused suspicion. This type of adhesion one hears little about from Western clinics; but posterior mid-peripheral adhesions, sometimes in ring form, which prevent the pupil's dilating, but do not prevent its remaining round and active, must be carefully guarded against, for an attempt to deal with such by the intracapsular method may result in disaster.

If dilatation is poor, the operation may be started with an open mind and when the section is completed, the actual condition of affairs is determined by stroking the cornea, or gentle exploration with a repositor.

If there is a peripheral synechia, and it is extensive or firm, it may decide us to perform a capsulotomy; unless an intracapsular is definitely indicated, as for instance, in immature cataract. Should we decide to employ phakoërisis, or forceps extraction in cases of badly dilated pupils, we free the synechiae—if present and easily freed—and either cut the sphincter below or perform a marginal iridectomy.

In very favorable cases, the erisiphake is fitted through the pupil and under the iris, without enlarging the pupil. Here one must be exceptionally careful.

On the whole, with small rigid pupils we prefer to adopt the capsulotomy operation. But here, too, the capsulotomy operation has to be modified because in such cases there is difficulty in making a proper capsule flap with the knife, or performing an effective capsulotomy with forceps without an iridectomy.

If posterior peripheral synechiae are present and firm or annular, or there is difficulty in introducing the capsule forceps through the pupil, or a large nucleus

is present, an iridectomy is performed. The capsulotomy is performed with a forceps of a special type which removes a large portion of the capsule and is designed to work under the iris, if necessary.

The difficulty of delivering the lens in its capsule, or a large nucleus in extracapsular extraction, must not be forgotten when dealing with such small pupils, even if the sphincter has been divided or a marginal iridectomy has been done; and this is a very real drawback in many of our cases.

Much greater care must be exercised in cataract extraction with a small pupil, no matter which method is used. Many would say that the easiest way of getting over this difficulty is invariably to perform a complete iridectomy; but, as mentioned before, we think it is most important in intracapsular work to retain a round pupil if possible. Even in capsulotomy work the iris certainly plays a useful part in preventing cortical or capsular tags coming forward to the section. Hence the avoidance of the complete iridectomy unless indicated for other reasons. Surgeons have frequently observed that when an intracapsular operation is successfully undertaken in an eye with evidences of old inflammatory trouble, the eye is apt to remain perfectly quiet. For this reason it is often preferable to remove the cataract with limited adhesions by this method; but reasonable care must always be taken not to damage the iris with the drag or to tear the capsule, for it sometimes happens that the capsule, rather than the point of adhesion, gives way with the gentlest movement of the forceps. In fact it is always desirable gently to explore and break down such posterior adhesions first.

### Complications arising with blocking

Proptosis, as the result of hemorrhage into the orbit at the time of retrobulbar injection, may occasionally determine the postponement of the operation and the sending of the patient back to bed with eyes closed, an ointment dressing and a cold compress. This is not a serious matter in hospital practice, but it is one of the objections to retrobulbar injection in private practice. It can generally be avoided by using a small volume of fluid, not more than 1 c.c., and a very fine needle from which the syringe is detached before the injection. Should the proptosis be of mild degree, there is no absolute necessity to put off the operation, but in such a case we would adopt an extracapsular operation.

In cases of failure of the blocking, either retrobulbar or facial, a circumorbital infiltration may be given, and in fact if any patient is nervous of the pressure of the speculum, or the touching of lids and brows, there is no reason why a field block should not be given.

### Excessive nervousness and excitability, or violence

In spite of the establishment of rest prior to operation and the routine administration of sedatives to what is considered a suitable extent, the patient may exhibit an excessive nervousness during the preparation or when actually on the table. In this case we fall back on extra sedatives, such as hyoscine, if it has not already been exhibited, nembutal, 2 or 3 grains, or the like. The further administration of such drugs as allonal is continued in sufficient doses for some days. It is astonishing what large quantities of sedatives some of these excitable patients will stand, in whom it appears to be necessary for quietude. If a patient becomes quite out of hand in the theater sodium evipan may be used. In such patients a capsulotomy with a large bridge flap is adopted. They are subsequently watched carefully and the bandage opened early.

*Vomiting at the time of operation.* In

the ordinary routine use of morphia, we sometimes find that vomiting is produced; more rarely if the drug is fresh and atropine is combined with it. Occasionally other drugs produce vomiting in patients who have not had morphia during the preparation, and vomiting may occur apparently quite independently of drugs.

In private work morphia is not used unless we know it is well borne. Hospital practice is different, for the comfort one gets from morphia entirely outweighs the occasional disadvantages. Its value as a sedative is unsurpassed. In private practice it is sometimes worth while to try the effect of morphia beforehand, if we feel that it is really desirable to use it, or omnopon may be used instead. It is seldom that one has trouble with omnopon. Many patients, however, are able to inform the doctor as to whether they have ever had morphia and as to what its effect had been.

With restless, sleepless, agitated patients who are in the habit of taking barbiturate drugs, it has been worth while to try the effect of morphia once, two or three nights before the actual operation. Vomiting, should it occur then, is not necessarily associated in the mind of the patient with preparation for the operation, but gives the surgeon a necesary warning.

### Injections

*Adrenalin* is one of the few drugs used for injection that has given rise to distress during preparation for operation, and this is distinctly rare. Still it must be remembered that some patients do not stand adrenalin well. In private work one must guard against it. In the ordinary way the patient would not get more than a few minims of adrenalin with the preparatory injection and perhaps a few minims instilled into the eye. Occasionally in hospital practice, more is given with infiltration. We have never had to put off operation on account of such distress.

### Hemorrhage

Patients with sugar in the urine and certain others, arteriosclerotics for example, in whom we expect difficulty with a large flap, receive a calcium injection of 1½ gr. in 10 c.c. of distilled water intraveneously, just before the operation. In view of the fact that hemorrhage is a great cause of embarrassment in our hospital practice, it probably would be well if we gave calcium in all our cases of arteriosclerosis.

Hemoplastin and normal horse serum are not used before operation in the routine cataract work, but are, in treating recurring hemorrhages, or when a second operation must be performed on an eye in which a tendency to hemorrhage has previously been experienced. Antivenin, 1:5,000 solution, may be applied locally to a bleeding conjunctival surface, but we have not found it so valuable as is sometimes reported. A persistent bleeding vessel in the deep wound is occasionally encountered. It should be dealt with by the lightest possible touch of a very fine electro-cautery point at dull heat.

You are hardly so troubled by hemorrhage as we are. I have frequently contended that in my experience of cataract extraction hemorrhage is one of my greatest enemies. I have heard others say that hemorrhage does not wory them at all. I can understand this in Europe, where eyes may be reduced to bony whiteness by adrenalin; it is not so in India. There eyes are definitely more liable to hemorrhage, conjunctival and limbal, regardless of the method of preparation and the type of adrenalin used, than are eyes elsewhere.

With regard to the ill effects of tiny portions of clot and strands of fibrin, I may be more meticulous than some of my colleagues, perhaps unnecessarily so; but my experience is that these bands of fibrin and portions of clot which form on the lips of the deep wound and adhere

to the face of the iris or capsule, are often responsible for tiny peripheral synechiae and pigmented bands on the capsule which might be avoided if hemorrhage did not occur; for instance, clot may lodge in ring form in the angle and give rise to anterior peripheral synechiae. At all events, one is quite apt to have hemorrhage with a conjunctival flap, more so still with a bridge flap; and the moment we see hemorrhage in the anterior chamber, it is important to make a light rotatory motion on the cornea, break up and defibrinate the blood, rather than to have a clot form firmly in position.

Not only does hemorrhage with subsequent clot give rise to undesirable sequelae, but also to immediate difficulty. In intracapsular work it prevents one's view when applying the erisiphake or forceps. When this occurs we wash out the anterior chamber with the irrigator. In capsulotomy the same is true, and blood and cortex are more difficult to get rid of than blood alone.

We cannot always anticipate such hemorrhage. I personally think that it is largely due to the condition of the blood vessels in the decrepit arteriosclerotic individuals with whom we have to deal; but I have seen hemorrhage take place in many clinics where such patients were not in the majority. I think it is important to get rid of all portions of clot and fragments of fibrin from the anterior chamber before closing the eye, if this is possible without doing harm, and such is our practice. It is most readily effected by means of the irrigator, which causes any clot that has formed to rope and gather itself into masses and strings, so that thereafter gentle removal with the forceps is feasible.

### The iris

One of the first difficulties that is likely to occur is the fouling of the iris with the knife during section. This is more apt to take place when the chamber is shallow from any cause before the section is made, or when fluid escapes rapidly for some reason in the initial stages of the section. In difficult extraction, such as an attempt at capsulotomy with the knife, with a small pupil, or in troublesome patients, one is more likely to be presented with this complication.

Perhaps the best thing to do is to withdraw the knife, fill the chamber with the irrigator, reintroduce a smaller-sized knife quickly, and complete the section. Another possibility is to lift the eye with the blade of the knife turning the edge slightly upwards, thereby producing slight negative pressure, which tends to cause the iris to fall back off the edge. If the iris is caught nearer the toe, one may complete the section by wheeling the heel of the knife and depressing the toe and vice versa. Of all the devices, we prefer withdrawal and starting again.

*Back of knife up.* It is hardly necessary to say that if the knife is put in wrongly, it should be withdrawn; and the chamber filled and a fresh start made.

It sometimes happens that an iris is so flabby that although we desire to maintain a round pupil with a small buttonhole iridectomy, the slightest movement or touch on the globe during the toilet of the wound starts prolapse. It may be that during irrigation the iris is apt to float up into the wound and the sphincter will not contract; or a slight upward distortion of the pupil with a hernia of the iris root into the deep wound is apt to defy our efforts at reposition. In such cases it is wiser to perform either a complete iridectomy, or possibly make two peripheral buttonholes.

### The capsule

A capsule which did not strike one as absolutely smooth at a previous inspection, may behave like ice when the for-

ceps is applied; and only then is it realized that the case is unsuitable for intracapsular extraction with the forceps. Naturally such a case can be dealt with quite readily by the erisiphake or by capsulotomy with a suitable toothed forceps, so as to remove an effective amount of the anterior capsule. We may decide, conversely, when the patient is on the table, that the lens previously selected for capsulotomy with forceps is more suitable for intracapsular delivery. A hypermature cataract, for example, may be best lifted out complete if it can be readily gripped.

### The zonule

In very old patients, especially in those with hypermature cataract or total sclerosis, the zonule may be excessively friable or even atrophic and dehiscent in part. There may be no actual subluxation, or it may not be obvious. Vitreous, if fluid, may have found its way into the posterior chamber. In such cases phakoërisis is not attempted; they may be dealt with by using the intracapsular forceps, but each case requires individual treatment.

### Nucleus of morgagnian cataract

In dealing with morgagnian cataract, it may happen that the small nucleus eludes our efforts to dislocate it through the pupil. Under such circumstances on no account must one try more forceful dipping or pushing movements, for it is very easy in such cases to tear the zonule, while the small nucleus merely moves round the fornix of the capsule, since we fail to guide it through the central aperture.

### Deep orbit

Although it often means that there is the advantage of a minimal external pressure in the globe, this may give rise to difficulties in making the section. If, to commence with, the speculum is depressed and the globe is elevated with the fixation forceps gripping near the lower limbus, the puncture and counterpuncture are readily made. Thereafter the knife aids in elevating the globe so that the point may be carried free of the lids. It is an advantage to use a narrow, short blade.

### Mishaps associated with forward displacement of the posterior segment

It will be convenient when discussing this contingency to use, if somewhat loosely, the following expressions: 1. Increase of pressure in, or volume of, the posterior segment. 2. Establishment of negative pressure in the posterior segment.

By the first we mean any condition or set of conditions which, on completion of the section, determine a pushing forward of the globe contents other than aqueous, so that there is a tendency to herniation. This may vary from an obliteration of the anterior chamber by lens and iris, with a possible slight herniation of the latter into the wound and a tendency to the formation of a transverse line of corneal tension, to an immediate spontaneous delivery of the lens accompanied by gaping section and loss of vitreous.

By the second we mean a dragging forward of the lids and their fascial attachments, like lifting the mouth of a badly filled sac so that, as it becomes taut, the contents fall back. Similarly on elevating the lids certain of the orbital contents tend to come forward, allowing the globe to fall back and taking pressure off its contents, thereby determining an inclination for the corneal flap to collapse without tension at its hinge. This tendency is, of course, vastly enhanced by akinesia of those muscles which, directly or indirectly, are likely to act in this way.

We will consider: A. Some causes of increased pressure in the posterior seg-

ment which may determine an embarrassing movement forward of its contents. B. Some of the effects of the forward movement.

*A. Factors influencing pressure in the posterior segment.* There are several factors which may give rise to invasion of the anterior segment or increased volume of the posterior segment; but we must keep in mind that the problem is somewhat different in the case of the healthy vitreous and the more fluid degenerate vitreous.

The displacement of the vitreous may be due to: *(a) Pressure from without.*

(1) This may be associated with the potential state of the orbit; for instance, a bulging eye of any sort such as fatty orbit in patients of obese or plethoric habit, the exophthalmos of Graves's disease, or a hemorrhage following injection. One may occasionally make special provisions for the bulging eye, as by removing fat from the orbit; canthotomy is an advantage in minor degrees; in any case we try to establish negative pressure and adopt conservative procedure. These precautions do not altogether nullify the pressure element; there still remains an expulsive tendency which we must carefully guard against, even if reduced.

(2) Active muscular movement on the part of the patient.

In this connection we have made a number of experimental observations and we find that if negative pressure is established in an eye with an open section and the lens removed, so that the iris has fallen back into the cup of the patellar fossa, the effect of the slightest movement may be easily observed. Under such circumstances on ordering the patient to look here or there, the initiation of the movement is invariably accompanied by a thrust forward of the vitreous body, so that the anterior chamber no longer exists. It is as if the muscles at the initiation of movement squeezed the contents of the globe forward.

This movement on the part of the patient is, of course, very largely controlled by an effective retrobulbar block.

Bridle suture. We do not now favor a bridle suture in the superior rectus, for under similar experimental conditions it may be observed that a pull against such a fixed point is just the kind of force that causes the vitreous to thrust itself forward. The thrust of the vitreous forward is not so damaging if the movement of the eye is not brought to an abrupt halt by forceps or suture.

One of the old causes of the vitreous threat was the contraction of the orbicularis, and squeezing was a bogey in our operative work 15 years ago, but today effective paralysis of the orbicularis eliminates that. Similarly, the retrobulbar block diminishes rotatory movement. Such movements may be eliminated by pushing narcotics, if so desired.

(3) Pressure by operator or assistant.

A movement of the operator or his assistant, in other words, careless manipulation of the eye, may determine a forward vitreous thrust. Deliberate tearing of the zonule capsule barrier (as in the intracapsular procedure), which otherwise might retain the posterior-segment contents, makes a lesser degree of pressure more effective, more especially so in the case of the fluid vitreous.

*(b) Pressure may come from within* which is beyond the control of the operator and his assistant. This is perhaps a more serious cause of vitreous invading the anterior segment, inasmuch as it is more difficult to combat. There are a certain number of eyes in which, either immediately after making the section or during the course of the operation, the posterior segment appears to undergo a spontaneous increase of volume. Theoretically this might be due to: (1) An

expansion of the vitreous itself. (2) a rapid accumulation of tissue fluid, or more probably, (3) An increased volume of the vascular bed. That the latter does take place I have every reason to think, because at times we have seen apparent examples of it. Thus, on completing a capsulotomy operation, in a perfectly quiet patient with a straightforward eye, in which the execution and result were apparently perfect, just before the lids were closed the section was observed to elevate, the iris root came forward into the deep wound throughout the whole extent of the section, the posterior capsule bulged, the chamber emptied, the section finally gaped, and a transverse mark appeared on the cornea. There is nothing to be done in such a case, but to close the eye and try to keep the patient as quiet as possible. The section may become perfectly level, and an uninterrupted recovery take place. It is essential, I think, that the patient's calm should be preserved, for such a sequence may be of nervous origin. But quite apart from the possibility of psychic or reflex factors causing alterations in volume of the vascular bed, there may be expansion connected with the effect of sudden alteration in the relative pressure on the intraocular capillaries, consequent to the making of the section, or conceivably a vascular-bed dilatation as a result of mechanical irritation of the uveal capillaries.

(4) An increase in volume of the posterior segment may also be due to hemorrhage. It would seem that this is more likely to occur in arteriosclerotics, diabetics, in conditions where the vascular walls are damaged, increased blood pressure, or a preglaucomatous state. In extreme degrees the hemorrhage may be expulsive, but this constitutes a complication in a class by itself.

Preliminary bleeding of the patient and purgatives may be resorted to in cases of plethora and high blood pressure. In others, such as diabetics and decrescent arteriosclerotics, intravenous injections of calcium, 1½ grains in 10 c.c. of water, an hour before the operation may be found useful.

The importance of posterior-segment pressure and displacement of the vitreous can hardly be overstated, since the difference between cataract extraction in the collapsing posterior segment and the expanding posterior segment is extreme.

B. *Effects of posterior-segment pressure—inclination for the contents to come forward. Gaping section and spontaneous delivery.* Ordinarily we would not perform intracapsular extraction on eyes in which we anticipated an increase of pressure in the posterior segment; such as, in the case of a bulging eye, or of a shallow chamber, especially in the full-blooded and plethoric, nor yet in the young nervous patient with a soft pale cortex and pale nucleus, nor in cataracts with a swollen-sectored cortex (probably not so common with you, except recently in cataracts due to dinitrophenol). Minor degrees of posterior-segment thrust are much more capable of producing vitreous complications in intracapsular work, since the restraining influence of the zonule capsule diaphragm is deliberately removed.

The following remarks which apply to capsulotomy cases, unless otherwise indicated apply with even greater force to intracapsular work.

In certain eyes, on completion of the section, the section tends to gape and there is an inclination to spontaneous delivery. There is much less chance of an accident's happening if capsulotomy has been performed before the section is completed. But should this not have been done, it is desirable to establish negative pressure by means of elevating the lids on the speculum and allowing the globe

to fall back, and to rupture the capsule immediately.

### Actual vitreous escape

When the lens delivers spontaneously there may be at the same time an immediate vitreous escape. The lens in its capsule or, when the latter ruptures, the nucleus and most of the cortex, or even the whole cortex and capsule, may come away with a rush. It is useless to do anything except cut away the prolapsing vitreous. One may stitch the flap, but even that does not help matters much. As a rule, the section tends to heal fairly quickly, leaving the familiar semilunar up-drawn pupil, with greater or lesser degrees of irritation.

In some cases there is astonishingly little reaction and a quiet eye may be maintained for years, with good vision. On the other hand, as the mild or subacute cyclitic reaction subsides, proliferative changes associated with the healing process radiate from the region of impaction, linear opacities gradually make their appearance on the shelving condensed vitreous face, and opaque fibrillae lead back into the vitreous body.

In the worst event as organization proceeds, the late sequelae of severe vitreous trauma make their appearance, such as deep vitreous opacities and fluid degeneration with denser proliferative changes of the anterior layer; added to which are the effects of traction on the iris and ciliary body, prolonged irritability, deep injection and other evidences of cyclitis, detachment of uvea and retina, keratitis, lacrimation and photophobia, with vascular invasion of the cornea from the region of the section, possibly glaucoma, or a soft blind painful eye. If cortex or capsule are left behind the complication is greater, both as regards severity of reaction, immediate interference with vision, and late sequelae.

### Threatened vitreous escape

Here when the section has been completed the corneal flap elevates and looks taut across the hinge; after delivery the posterior capsule holds but remains bulging, the deep wound slightly gapes, and the iris tends to prolapse. Having completed the delivery we irrigate gently to get away as much cortex as possible; if the iris has herniated we replace it with a repositor. Closure of the lids, followed by gentle rotatory massage with the finger, is often useful in establishing a flat section and round pupil. We may then do a peripheral iridotomy and succeed in getting a fairly clear pupillary area with a flat deep wound and an empty chamber, in spite of a bulging posterior segment.

*Lesser degrees of posterior segment pressure.* In lesser degrees the moment the aqueous escapes, the lens comes forward, occupying the space left by the aqueous, but the section does not gape after delivery. The corneal flap retains its shape and tension, and does not tend to get slack and fall in. After extraction the posterior capsule remains tense, the vitreous bulging. This is a fairly ordinary condition, and probably more common with you than the collapsing type of posterior segment.

In speaking of the behavior of the cornea upon completion of the section and its relation to posterior-segment thrust, it must be clearly borne in mind that a "rigid" cornea retains its shape and does not fall in, even with an air-filled chamber; also a dimpled hinge due to transverse tension may result from delivery through too small a section. The above remarks do not take cognizance of these conditions but presuppose an ample section and normal cornea.

*Dangers of a bulging posterior capsule.* There may be more cortex left in such an eye than is desirable. Great care must be exercised in washing it out because of

the tension of the posterior capsule. In those eyes in which the posterior segment bulges forward and obliterates the chamber, the posterior capsule forms a hernia in the aperture of the anterior capsule and shuts off in valvelike manner the equatorial cortex. It may prevent the equatorial ring of the lens matter from escaping, either with the stream from the irrigator or gentle massage with the nozzle.

It is dangerous to indulge in instrumentation in such eyes. These must be handled carefully and on no account must the posterior capsule be touched with any instrument that is sharp; otherwise a sudden blackening of the pupil indicates that vitreous is pouring through the rent and under some slight degree of pressure is finding its way into the anterior chamber, against the back of the cornea towards the wound, or out through the wound, an undesirable position. In all capsulotomy work, it is most important to get away as much of the anterior capsule and as much of the cortex as possible; but one must not carry this to the extent of tearing the diaphragm in the effort.

### Difficulties with the vitreous in intracapsular extraction

Since we do not elect to operate on eyes suspected of exercising a posterior-segment thrust, we rarely ought to have an immediate expulsive vitreous escape, but even so complications with forward displacement of the vitreous do occur, some of which may be mentioned here. In addition there is the possible complication of misapplied suction in the case of phakoërisis.

1. There may be a free herniation through the pupil, at the time of delivery, which invades the anterior chamber and reaches the wound or escapes. The position is the same as that above mentioned under capsulotomy with vitreous escape, or impaction free of lens matter; an anterior vitreous invasion throughout the wound with possible complications. The familiar hammock-shaped (drawn-up) pupil—not infrequently seen after expression—is indicative of such a sequence. The appearances vary according to whether there is a complete iridectomy or not, but the sequence is similar. The vitreous submerges the face of the iris above—or the pillars of the coloboma—pressing it against the ciliary body whilst the vitreous welling forward impacts in, or adheres to, the back of the wound. Vitreous adhesions are also formed with the retroverted iris and ciliary body, or with the rolled pillars of the coloboma in the case of an iridectomy. The regions of vitreous adhesions—wound, iris and ciliary—eventually become involved in irritative, proliferative and degenerative phenomena of lesser or greater degree. The gradual contraction of cicatricial tissue produces the typical progressive upward drag, with characteristic appearance of the iris face and horns of the crescent-shaped aperture. The horns of the crescent, representing the lateral extremities of a horizontally ovoid pupil—or the rolled-back pillars of the coloboma in the case of an iridectomy—embrace the lateral aspects of the vitreous on either side and dip back to join the deeper plane of the ciliary body behind the column of vitreous as it reaches forward to its adhesion to, or impaction in, the section. Where the pillars of the iris and vitreous cross, that is, at the extremities of the hammock-pupil or horns of the crescent, one may find a definite vitreous-iris adhesion with fibrillae radiating from it. The face of the vitreous, too, shares in the proliferative process and a definite membranous change may here form an after cataract of fibroblastic origin, obliterating the updrawn pupil. On the other hand,

the vitreous face may remain relatively clear for years. Even in pure vitreous escapes, that is, uncomplicated by capsule-lens débris, a vitreous wound or vitreous iris adhesion may be followed by progressive irritability and serious sequelae, such as are mentioned under capsulotomy. It is not so bad if the capsule does not rupture at the same time; then we may get a similar type of complication as previously described under vitreous escape in capsulotomy complicated by lens remnants.

2. The vitreous may come forward after delivery and invade the anterior chamber, the pupil may remain round or slightly distorted and the chamber empty. Some of the vitreous may cover the iris face and find its way to the section, but not actually escape. The condition is merely a variation of a frank escape.

Here we may be left with a greater or less degree of anterior adhesion to the iris face or section. Should an iridectomy have been performed, the angles and pillars of the coloboma are apt to become rolled back towards the ciliary body, and a boat-shaped pupil established; in this case the vitreous adheres to the section, shelving forward in a plane anterior to the plane of the iris. Hence the importance of retaining a round pupil in intracapsular extraction. If the vitreous face is contained behind the iris and controlled by the pupil, the undesirable consequences of a vitreous wound adhesion are averted.

3. The chamber may remain empty after delivery, the vitreous pushing forward the iris, but the pupil is round and contracts well on the vitreous hernia which protrudes through it, but which is limited to the pupillary area and does not reach the section. In such an eye a complete iridectomy gives the vitreous more opportunity to form anterior adhesions than is the case under conditions described in the previous heading. In the case of fluid vitreous, large herniae may creep and even fill the chamber and set up glaucoma; but in the case of normal vitreous, a large mushroom may do no harm, unless, perchance, an anterior synechia is established with the posterior corneal surface. Minor degrees of vitreous synechiae, including vitreous bands and strings, will be referred to later.

4. The lens may be dislocated into the vitreous.

5. The erisiphake may slip to the zonule, tear it, and suck up vitreous.

6. The mistake may be made of applying the erisiphake to a subluxated lens, or trying to reapply it when it has slipped, with the possibility of sucking up vitreous in either event.

The changes following a dislocation treated by spoon extraction need not be described, nor yet those of vitreous evacuation with the erisiphake. They are both major vitreous traumata. If surgical catastrophies of such an order do sometimes result in an incomplete wreck, it is hardly a matter upon which the operator should plume himself; nor are the lesser traumata of the vitreous to which reference has been made. One has not to look far, even amongst the results from good hands, to find the irritable eye which was apparently "a perfect operation." The corneal microscope often shows how poor our best efforts may be.

### Torn capsule in intracapsular operations

This has been referred to in the forceps procedure, but it may also happen in the suction-pump methods. We need not go into detail here as to why this accident occurs with the erisiphake. When it does occur we may be left with this complication of cortex mixed with vitreous; on the other hand if the rupture takes place when delivery is half through, or prac-

tically complete, it may be successfully concluded with forceps, or otherwise, secundum artem, without bad result.

*Vitreous herniations in capsulotomy cases in which there is no tendency for posterior-segment contents to come forward on completion of the section.* It sometimes happens, especially in cases with weak friable zonules that either at the time of effecting the delivery of the nucleus, or during the irrigation or massaging away of the cortex, or even when doing a capsulotomy with forceps, that vitreous makes its appearance at one quadrant and encroaches on the pupil. With a quiet patient and good akinesia this is most likely to be the fault of the operator. Should there be a further positive pressure at such a moment—by the surgeon, for example—a vitreous invasion of the chamber may be determined, while the capsule and cortical remains are rolled to one side. It is the same complication that sometimes takes place in a failed intracapsular with forceps, where the zonule tears and the capsule tears.

It is seldom that one is left in doubt as to whether vitreous has come forward beyond the level of the pupil; it is easily recognized as one watches the progress of the operation. This must always be regarded as a serious complication but one which may be improved on. Negative pressure must be well established, and if possible the burst capsule with the remains of cortex is gently removed by gripping it with forceps and employing a lateral swinging motion. If this is effected completely the case is treated as intracapsular. With lesser degrees of vitreous herniation the pupil often contracts small and round and the hernia is well controlled. When removing portions of capsule or cortex in such cases, threads of vitreous are quite likely to be drawn into the wound if it has not already been invaded.

If, on the other hand, the vitreous extensively invades the chamber, engages in the wound, or escapes whilst capsule and cortex are pushed deep to the iris, the face of which is bathed with vitreous-containing particles of cortex, then little can be done. Lens débris is cleared as far as possible with forceps, prolapsing vitreous cut away, and the section sutured. A degenerate or fluid vitreous is more apt to flood the chamber and "run" on the slightest provocation, but may be more easy to clear of débris.

Such a complication, where vitreous is mixed with cortical remains, is one of the worst catastrophies that may befall during an operation. Should the cortex have been washed away clean before the capsule or zonule tears and vitreous invades the pupil, it is sometimes easy and desirable to deal with the capsule, which is often readily removed without serious vitreous invasion of the chamber. On the other hand, it may be left behind, since a cortex-free capsule is not such an irritant as cortex. A central rupture of posterior capsule is an infinitely more favorable state of affairs than a torn zonule and a peripheral vitreous hernia.

*Removal of capsule complete after the capsulotomy operation.* We often adopt the technique in hypermature cataracts with very friable capsules and zonules, of doing a sort of two-stage intracapsular. First a capsulotomy is done, gently all cortex is washed away, and then the whole capsule is removed very slowly and carefully with forceps. The effect is exactly the same as in an intracapsular extraction. The technique, a forceps held in each hand and an alternate lateral slow drag applied, will be detailed later.

*Vitreous herniations and escapes.* General: In the case of vitreous prolapsing through the pupil and impacting in the deep wound the condition is the same as a frank escape. It differs only in degree.

A free escape may leave a horizontal or boat-shaped pupil and quiet eye—a relatively good eye for a time. On the other hand, a band of vitreous attached to the iris face or angle of the section may actually give rise to prolonged postoperative trouble, although the pupil may remain round at the time and the apparent damage be small.

A small band of vitreous running from the vitreous face to the section may, however, be satisfactorily treated, but large impactions or adhesions to the iris face may not. It is by mere chance that a good eye results from a large invasion which forms an anterior attachment to the iris or to the section or to both. Such large anterior vitreous adhesions and impactions are liable to lead to the sequelae already referred to.

It is useless to console ourselves with the thought that one can get a visually good eye after a vitreous escape. No doubt escapes and impactions give less trouble when capsule and cortex have come away clean, since the vitreous unlike the lens cortex is not an irritant any more than the zonule or the empty capsule. It is the adhesions to the section and iris face and the drag on the ciliary body that give rise to trouble.

The longer one practices cataract extraction, the more definitely one forms the opinion that an uncontrolled fluid vitreous or a normal vitreous which, herniating freely, adheres to the iris face or is caught up by broad bands to the section, or a vitreous which escapes through the section and forms a gross impaction, are varying degrees of a very undesirable complication.

In the ordinary intracapsular extraction, even a fairly large vitreous prolapse through the pupil at the time of operation is likely to become well controlled as soon as the pupil contracts down; within a short time the hernia develops a condensation layer which delimits it and to which the iris does not adhere except under conditions of inflammation such as would cause posterior synechiae in a normal eye.

Uncontrolled forward displacements of vitreous, impactions, and escapes in which the vitreous is not free of cortical matter, such as have been referred to above, may be followed by almost any degree of an irritative inflammatory response. Even in such there are varying degrees of sequelae, and after prolonged irritation one may get a visual result more or less satisfactory.

On the whole, such complications are likely to end up with a very troublesome if not useless eye in which the organization of inflammatory products defeats the visual function if and when the eye does get quiet. Many such eyes, however, become painful and blind and have to be removed. Whenever the vitreous threatens to invade the anterior chamber or escape, in either type of procedure, we must immediately try to effect further negative pressure. In case it does not tend to sink back but rather to flood the anterior chamber or escape, we close the eye without iridotomy, stitch the flap, and give eserine. If it does tend to go back and the section is not invaded, we make a buttonhole, carefully avoiding the vitreous hernia, if that is possible, and give eserine.

Unless vitreous has reached the section, large anterior-chamber invasions may possibly be controlled by eserine, but in spite of miotics the vitreous may form adhesions to the iris face or an isolated band of vitreous may reach the section.

It is undesirable in the limited herniations of capsulotomy to use eserine, for one reason, amongst others, that the eye is slightly irritable after an extracapsular extraction on account of the presence of small quantities of cortical matter on the

iris face. The mere fact of having cortex free in the chamber is enough in itself to demand atropine. But should we have vitreous coming through into the chamber after a capsulotomy and forming a progressive hernia, it sometimes pays to use eserine. Each case must be decided on its merits and the lesser of two evils chosen. If the cortex and capsule have been taken clean away, miosis is essential.

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## TRICHLORACETIC ACID IN THE TREATMENT OF IRIS PROLAPSE

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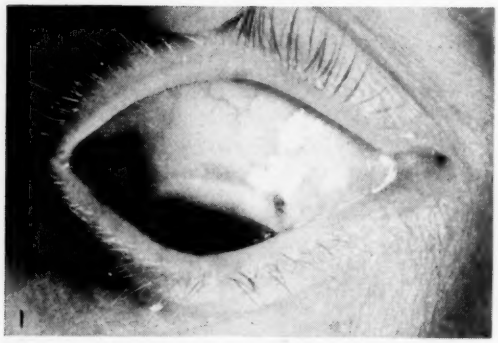
The history of the use of trichloracetic acid in ophthalmology is briefly reviewed. The types of cases best suited for this treatment, and the advantages of trichloracetic acid over the actual cautery are outlined. A description is given. The authors report five cases. From the Department of Ophthalmology, Stanford University Medical School.

The use of trichloracetic acid in ophthalmology is not a new thing. In 1903 Bulson[1] cauterized corneal ulcers with this agent, the idea having been suggested by Fox at an earlier date. It has likewise been employed in the treatment of xanthalasmata, warty growths, and other lid conditions. To Dr. Harold Gifford,[2] who had used trichloracetic acid for years in the treatment of corneal ulcer, belongs the credit for its use in the treatment of prolapsed iris. In 1910 he described the dangers of sympathetic ophthalmia following use of the actual cautery, and offered as its substitute trichloracetic acid. No papers on the subject have appeared since this time, and while some ophthalmologists are using this method, the majority do not seem to be acquainted with it.

The type of case best suited for treatment with trichloracetic acid is:

(1) Old Prolapses—the iris cannot be freed from the edge of the wound and complete excision or actual cauterization involves excessive trauma with subsequent reaction. (2) Some cases of large iris prolapse through the cornea to which conjunctival flaps can be made to adhere with difficulty or not at all. Trichloracetic acid produces a firm nonirritating scar. (3) Prolapse under the conjunctiva following cataract extraction. This can safely be let alone for a few weeks until the danger resulting from further manipulations on the eye that has been operated upon has passed. (4) Iris prolapse following cataract extractions which are not under the conjunctival flap. In an eye that has been operated upon the iris is sometimes difficult to excise. Applications of trichloracetic acid cause a thin coagulum to form over the iris, preventing bacteria from entering the wound, and in most cases successfully reduce the prolapse. (5) Prolapse recurring during cataract extraction with vitreous prolapse when the iris cannot be replaced or excised. (6) Cauterization with trichloracetic acid may be used effectively when recurrent vitreous blebs prevent prompt closure of the wound following removal of a cataract, as was done in case 2 of this series.

The advantages of trichloracetic acid over the actual cautery are several: (1) The acid produces a dry, white coagulum which prevents the entrance of bacteria; whereas the cautery causes sloughs and burns tissue and therefore actually favors the multiplication of bacteria. Moreover, this coagulum is formed immedi-



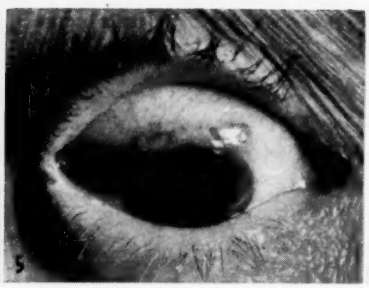


Fig. 1 (Bettman and H. Barkan). Case 2. At completion of treatment.

Fig. 2 (Bettman and H. Barkan). Case 4. At beginning of treatment.

Fig. 3 (Bettman and H. Barkan). Case 4. After twelve applications.

Fig. 4 (Bettman and H. Barkan). Case 5. At beginning of treatment.

Fig. 5 (Bettman and H. Barkan). Case 5. After fourteen applications three weeks later.

ately, and is therefore a guide to its application. (2) A firmer cicatrix results and there is therefore less danger of a resulting staphyloma when trichloracetic is used. (3) The acid can be applied more evenly over a large prolapse. (4) There is less reaction following its use than when the actual cautery is applied.

Trichloracetic acid ($CCl_3CO_2H$) is obtained in crystalline form, and in this form is exceedingly hygroscopic. The method of using it is as follows: The eye is thoroughly cocainized. A few of the crystals are put into a medicine glass and one drop of saline is added. It is essential that only one drop be added in order that a saturated solution may be obtained. The crystals go into solution quickly and absorb sufficient water from the air to dissolve completely. A toothpick is dipped into the solution. The wood absorbs enough acid for the purpose and any ex-

cess is carefully wiped off on the edge of the medicine glass. The region of the iris prolapse is dried with a cotton applicator. The point of the applicator containing the acid is gently touched to all parts of the prolapsed iris or, if the iris is under the conjunctiva, to the conjunctiva over it. Almost immediately the prolapse will be seen to turn a milky-white color. After a few minutes (the eye being held open during this time) the eye is irrigated well with saline to wash out the remaining acid.

The above procedure is repeated daily for about a week, and then about twice weekly. After a week's applications the prolapse diminishes in size, flattens remarkably, and begins to be covered with a thin white eschar. In one of our cases (case 1) the patient's eye had been irritable and the symptoms were relieved in about a week's time. Naturally, the total period of treatment varies with each case and is determined by the progress made. As the following cases demonstrate, the use of trichloracetic acid in selected cases has been very satisfactory.

## Case Reports

*Case 1.* G. S., a 68-year-old male had undergone cataract extraction four years previously at another hospital. Prolapse of the iris occurred at the operation; it was not treated, and the patient had had moderate photophobia since that time. During the past three months the eye that had been operated upon became tender and irritable, and the prolapse had increased in size.

After three applications of trichloracetic acid the symptoms were relieved. After three more applications the prolapse, which was herniated and raised, had become definitely flatter, somewhat smaller, and covered with a thin white coagulum. Trichloracetic acid was applied 15 more times (a total of 21 applications). At the end of this time the prolapse was flat and covered with a white scar.

*Case 2.* V. M., a female, aged 64 years, had had a cataract extraction performed on November 1, 1935, with loss of vitreous, and the prolapse of the iris at either side of the corneal incision. Application of trichloracetic acid to the prolapsed iris was begun on December 17, 1935, and eight applications were made during the course of the following month. After four applications the areas of prolapsed iris were definitely smaller and grayish. At the end of the treatment they were approximately one fifth of their former size and well covered with a fibrous layer; the eye was pale and the patient had no symptoms. A photograph at the completion of treatment is shown (figure 1).

*Case 3.* I. S., a male, aged 52 years, had had an intracapsular cataract extraction with a narrow conjunctival flap. A bleb of vitreous presented from under the flap and was excised. On the fifth postoperative day a bleb of vitreous again presented from under the edge of the conjunctival flap. The vitreous bleb was touched with trichloracetic acid. There was drainage of a fluid very thin in consistency, and trichloracetic acid was applied on each of the next two days. On the following day the fistula was entirely closed and has remained so until the present time, a period of six months. At present the scar is detectable only by use of the slitlamp.

*Case 4.* W. H., a 52-year-old male, had had a cataract extraction, right eye, in November, 1935, at another hospital. There was a large prolapse of the iris under the conjunctival flap. Treatment with trichloracetic acid was begun on June 3, 1936, at which time a picture was taken (figure 2). After three applications the

prolapsed area had become noticeably flatter. A total of 12 applications had been made when the second photograph (figure 3) was taken.

*Case 5.* J. M., a male, 55 years of age had had a cataractous, subluxated lens removed from the right eye (his only eye) at another hospital in 1932. Since this time he has had a herniated iris prolapse at either edge of the conjunctival flap, but covered by it. The prolapses have not changed in size and there have been no symptoms of irritation. The great difference in size, elevation, and protective covering brought about by the trichloracetic acid is well demonstrated by the difference between figure 4 taken on June 23, 1936, when treatment was started, and figure 5 taken on July 15, 1936. Trichloracetic acid was applied 14 times during the interval between these two dates.

## Conclusion

Trichloracetic acid is of very definite value in the treatment of certain types of iris prolapse. In the proper cases it produces results which cannot be equaled by other methods of treatment, and we believe it deserves more general use.

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[1] Bulson, A. E. Trichloracetic acid treatment of infective ulcers of the cornea. Ophth. Rec., 1903, v. 12, p. 69.

[2] Gifford, H. The dangers of sympathetic ophthalmia from the use of the cautery in treating iris prolapse. Jour. Amer. Med. Assoc., 1910, v. 55, July 30, p. 368.

# SYMPATHETIC OPHTHALMIA*

## A STUDY OF SOME CLINICAL AND PATHOLOGICAL FACTORS IN THIRTY-TWO CASES

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In 1933 Dr. Lawrence T. Post read a paper on sympathetic ophthalmia[1] before the Section of Ophthalmology and Otolaryngology of the Southern Medical Association. The material in the paper was based upon a clinical study of twenty-eight cases, specimens from which had been examined microscopically. In his paper, Dr. Post stated that a detailed study including the pathological aspects of these cases might be valuable, and it is at his suggestion that this study has been made.

Since the time Dr. Post presented his paper, eyes from five additional cases of sympathetic ophthalmia have been received and examined in the pathological laboratory of the Department of Ophthalmology of Washington University. However, one case mentioned by him, in which both eyes were examined pathologically, has since been diagnosed as tuberculous uveitis and deleted from the series. This report is based, therefore, on a study of thirty-two cases of sympathetic ophthalmia in all of which pathological examination of the primarily affected eye was made. The pathological studies were made under the supervision of Dr. Harvey D. Lamb, Assistant Professor of Ophthalmic Pathology, Washington University, to whom all thanks are due for his invaluable aid in the preparation of this paper.

* From the Department of Ophthalmology, Washington University, St. Louis, Missouri. Thesis submitted to the Graduate School of Medicine of the University of Pennsylvania in partial fulfillment of the requirements for the degree of Master of Medical Science [M.Sc. (Med.)] or graduate work in ophthalmology.

It should be explained that many of the specimens included in this series were sent to the laboratory by physicians with whom we are not in close contact and in some cases information accompanying the specimens was not adequate for a study of this kind. However, the mode of production of the injury, something of the clinical condition of the injured eye, and the outcome of the sympathizing eye have been learned in all cases but one.

Twenty-four males and eight females were in the series. The preponderance of males over females may be explained by the greater tendency for males to be engaged in industrial pursuits predisposing to ocular injuries. The age incidence ranged from 4½ to 67 years in the cases where the age was given. The age incidence merely serves to emphasize again that sympathetic ophthalmia does occur in elderly people. In six of the thirty-five cases given by Fuchs[2] in his classical report the patients were 60 years old or over, and Joy[3] reports that eight of a series of forty-one persons with sympathetic ophthalmia were between 60 and 77 years of age. Twenty of the cases with the history of involvement of both eyes showed the first sign of involvement of the sympathizing eye sometime between the first of October and the latter part of April, as contrasted with eight occurring between May and September. The fact that somewhat over twice as many of the cases developed signs of uveitis in the fellow eye during the winter months as did during the summer months is interesting in the light of Waldmann's[4] statistics, which showed that sympathetic ophthalmia occurs four times as frequently

between October and April as in the other period. When the season of injury is considered we find in the same group that fourteen of the patients suffered injury and outbreak during the winter months while six showed both phases in the summer period. This relationship tends to indicate that the injuries also are more frequent during the winter months, which tendency may in turn be related to occupational pursuits. Waldmann concluded that the seasonal incidence was indicative of a rhinogenous causative agent. Since in our series injuries were over twice as frequent in the winter months, our records would not necessarily confirm this.

In two of our cases (47* and 569, table 1**), no outbreak of uveitis was ever apparent in the fellow or uninjured eye, diagnosis being made entirely on pathological findings as described by Fuchs. In one case (875, table 1), uveitis was discovered similtaneously in each eye several weeks after both eyes had been operated upon. In two cases which showed both eyes involved there was no perforation. One of these cases (4,*** table 2), in which the eye was injured superficially by a stick of wood, was examined immediately after the injury by a competent ophthalmologist who reported that no evidence of perforation was found. In the other case (71,**** table 1), a necrotic melanosarcoma of the choroid was discovered in the exciting eye. In case 47, in which there was never any involvement of the fellow eye, the operator reported that the exciting eye, which had been intensely inflamed previous to operation for a secondary glaucoma, showed no increase of the inflammation nor marked change in clinical appearance after the operation. The eye was removed when the patient finally consented to this procedure, which had been advised because of pain that continued after iridectomy.

In order to make a closer study of some of the factors that may influence the course of sympathetic ophthalmia, the cases have been grouped as to outcome. Patients who had a final visual result of 6/12 (20/40) or better in the sympathizing eye were considered to have had a favorable outcome (table 1). Those with resultant vision of less than 6/12 were classed as unfavorable (table 2).

If the two cases in which there was no involvement of the fellow eye are included, 18 or 56.2 percent in our series had a favorable outcome, 13 or 40.6 percent an unfavorable outcome, and in one case (3.2 percent) the outcome is unknown. Treatment was so variable in both groups that as a factor in the outcome it is not readily subject to analysis. It has, however, been included in the tabulation; and three cases of particular interest will be mentioned later.

The most common finding in both types of cases so classified was that of a soft, shrunken exciting eye (table 3). This condition was present in all of the unfavorable cases and in all but three of those with favorable outcome. It occurred in 28 cases or 87.5 percent of the total number, an exception being the one case in which the outcome is unknown. This is considered to be the most important finding of the study; for, while all of the specimens found to be shrunken when examined in the laboratory were not reported as being so upon clinical examination, it is safe to assume that most of the offending eyes must have been useless, softened eyes at the time of the

* This case was reported in detail by Higbee, E. H. Amer. Jour. Ophth., 1926, v. 9, no. 8.

** The tables compiled for this study will be found in the thesis published by the University of Pennsylvania Graduate School of Medicine.

*** This case was reported in detail by Lamb, H. D. Arch. of Ophth., 1932, v. 7, p. 97.

**** This case was reported in detail by Schwartz, F. O. Arch. of Ophth., 1927, v. 10.

outbreak of uveitis in the fellow eyes. This most definitely speaks for early removal of shrinking eyes following perforating injury. It is noteworthy in this connection that sympathetic ophthalmia developed in one case (78, table 1), two months after an eye which had been blind and shrunken for fifteen years was struck by a piece of coal which did not penetrate. The first injury fifteen years before was a perforating injury. Another case (750, table 2), resulted from an eye shrunken and irritable for thirteen years following perforation.

CLINICAL OBSERVATIONS AND HISTORY

*Vision in the Exciting Eye:* The frequent clinical reports of poor or absent vision in the exciting eye at the time of the outbreak of sympathetic ophthalmia in the fellow eye support these findings. If the cases in which there was no involvement of the fellow eye and the two in which we have no history as to vision are excluded, it is found that in seven cases or 43.7 percent of those in which the outcome was favorable there was no vision in the exciting eye at the time of the outbreak. In seven other cases in this group vision was limited to light perception (in some with good projection) and of the remainder no patient had more vision than that required to count fingers at a few inches. In the unfavorable group vision was totally absent in the exciting eye of five patients or 45.4 percent, and was limited to light perception (some with good projection) in four cases (36.3 percent). One patient in this group was reported as having had vision of 16/65 in the exciting eye, but this was recorded several days before the outbreak in the sympathizing eye. Vision in the two remaining cases was limited to the perception of hand movements at a few feet.

*Vision in the Sympathizing Eye:* Vision in the sympathizing eye at the time of the outbreak of uveitis was obtained in all but four cases. In the favorable group of cases vision ranged from "fingers counted at two feet" (case 1434, table 1) to 6/4 (case 625, table 1). Nine patients or 60 percent of the total number of this group in which the vision was reported had a vision of 6/12 or better just previous to enucleation of the exciting eye. Of the cases in which outcome was unfavorable, vision in the sympathizing eye was reported in eleven, varied from 2/200 (case 1025, table 2) to 6/5 (case 4, table 2), and was 6/12 or better in seven cases or 63.6 percent.

Apparently, then, the condition of either eye in respect to vision at the time of the onset of the inflammation in the sympathizing eye is no dependable index to the probable outcome of the latter.

*Region of Injury:* It has long been held by many observers that the place of the perforation in an injured eye is of great importance in the production of sympathetic ophthalmia. Lesions in the region of the ciliary body have been regarded as being particularly dangerous from this standpoint. This contention is not wholly supported by the findings in this series of cases. While it is true that sections through the wound were not available in every case, from those which do show the wound areas and from the clinical records it is apparent that less than half of the eyes in which there was a perforating injury sustained the injury in the region of the ciliary body. Similarly, in Fuchs's series, twenty-three of the thirty-five cases of sympathetic ophthalmia followed perforating injuries which were apparently not in the ciliary region. And, although Woods[5] states that sympathetic ophthalmia rarely results from a corneal wound, even when there are anterior synechiae, we find in our cases that the cornea was the site of the perforating injury in six cases or 18.9 percent. If in-

juries at the limbus, but not through the ciliary body, are included there are fifteen such cases (46.9 percent). Of our cases in which there was a perforation in the ciliary region, seven or 38.8 percent occurred in the favorable and six or 46.1 percent in the unfavorable group. Thus there was a slightly higher percentage of unfavorable cases resulting from injuries in the region of the ciliary body.

*Unhealed Wounds:* The reason why perforating injuries in the region of the ciliary body have been assumed to be more likely to result in sympathetic ophthalmia has been given by Parsons.[6] Although he himself does not believe that this predisposition necessarily exists, he states that the resultant incarceration cyclitis retards cicatrization and healing. While it has been shown that in our series almost half of the injuries were sustained in regions elsewhere than the ciliary body it is felt that retardation of the healing process may very well be a factor in the production of sympathetic uveitis. This assumption is in a great measure borne out by the finding previously mentioned, of a soft, shrunken exciting eye in 87.5 percent of the cases. Sections through the wound were available in twenty-eight of the thirty cases in which a perforating injury had occurred (table 3). Sixteen of these were in the favorable group and eleven in the unfavorable group of cases. The other case is that of which we have no history. In seventeen specimens, or 57.1 percent, the wound appeared to be unhealed. In one (case 1133) there was a wide separation of the scleral-wound margins with the ciliary body partly filling the wound area, in which there was no evidence of cicatrization. In case 875 an iris incarceration resulting from an iridencleisis operation had apparently prevented cicatrization. Eight of the eyes showed wounds filled with infiltrate consisting of specific cells, which might explain the retarded healing. Of the sixteen cases in the favorable group in which sections of the wound area were available, nine, or 56.2 percent, showed unhealed wounds; while healing was incomplete in eight, or 72.7 percent, of the eleven cases in the unfavorable group in which the wounds were included in the sections. Perhaps, then, retarded or incomplete healing of wounds is not only a predisposing factor in the development of sympathetic ophthalmia, but may also have an unfavorable influence on the course of the disease in the fellow eye.

*Interval:* Because of a possible relationship between continued inflammation in an exciting eye and the final result in the sympathizing eye, the interval between injury to the exciting eye and onset of uveitis in the fellow eye has been studied (tables 1 and 2). While an average of all such intervals is of little importance, since one or more cases in which the interval was extremely long would greatly influence the conclusion, certain individual cases are of interest. In case 625 (table 1) the first onset of symptoms in the sympathizing eye was nineteen years after the injury, but enucleation of the exciting eye soon after onset was followed by a very favorable outcome. In case 78, also in the favorable group, a perforating injury to the exciting eye occurred 15 years before the outbreak in the sympathizing eye. However, there had been a second, but nonperforating, injury to the exciting eye two months prior to the outbreak. In case 750 (table 2) a perforating injury had occurred 13½ years before the second eye became involved. The outcome in the sympathizing eye was unfavorable in this case, possibly because consent to the removal of the exciting eye was not given until the inflammation in the sympathizing eye had existed for several months. If case 47, in which the injured eye was removed nineteen days

after operation and in which there was no involvement of the fellow eye, is excluded, the shortest interval between injury and outbreak in the second eye occurred in a case (no. 34) of the unfavorable group. The interval was 23 days. In the favorable group, however, the interval was quite short in several cases, being less than 45 days in eight instances. The same is true of only two cases in the unfavorable group. In general, the interval between injury and outbreak of sympathetic ophthalmia did not seem to be significantly different in the favorable and unfavorable groups.

*Effects of Removal of the Exciting Eye:* The interval between the onset of inflammation in the sympathizing eye and enucleation of the exciting eye was found to be distinctly longer in those cases in which the outcome was unfavorable. In one case in this group six months intervened. In others there were intervals of five weeks and three weeks. Even if we exclude the case in which six months elapsed, an average of this interval in the unfavorable group is 8.7 days as contrasted with an average of 4.7 days in the favorable group. And this average, which is compiled from all the known intervals in the favorable class, is considerably lengthened by one case in which the interval was 5½ weeks. From these findings it would seem that early removal of the exciting eye is an important factor in the outcome. This is in agreement with the conclusion of Joy who also found that removal of the exciting eye favorably influenced the result in the sympathizing eye.

*Early Signs in the Sympathizing Eye:* As may be learned from tables 1 and 2, diagnosis of sympathetic ophthalmia was made in the majority of cases only after definite signs of an anterior uveitis were observed in the sympathizing eye. In only one case (750, table 2), was there reported the finding of the characteristic choroidal lesions described by Hirshberg[7] previous to enucleation of the exciting eye. Photophobia, ciliary injection, deposits on the posterior surface on the cornea, and cells floating in the anterior chamber, these accompanied by visual impairment, were the most common early signs reported. In two cases (750 and 639, table 2), however, neuroretinitis was the earliest untoward sign discovered in the sympathizing eye after a careful and thorough examination. In each of these the enucleation of the exciting eye was followed by a distinctly unfavorable outcome in the remaining eye. In four other cases neuroretinitis was observed at some time during the course of the inflammation in the sympathizing eye, but in all of these there had been preceding signs of uveitis.

*Sympathetic Ophthalmia Following Operative Wounds:* Eight of the cases developed subsequent upon surgical operations. Four followed operations for cataracts, four after operations to relieve increased intraocular tension. In one of the cataract extractions a needling had been attempted one week before the extraction with resultant dislocation of the lens into the vitreous chamber followed by intense congestion and rise of tension. The extraction in this case was accompanied by loss of vitreous, greatly delayed wound closure, and protracted inflammation. Another of the cataract extractions had been preceded five weeks previously by preliminary iridectomy, but no complications were reported in either operation.

Of the operations to relieve increased tension, three were iridectomies (one accompanied by a posterior sclerotomy) and one an iridencleisis. One of the iridectomies was followed on the 24th postoperative day by hypopyon, and when the eye was removed on the 40th postopera-

tive day, one day after onset of inflammation in the fellow eye, a melanosarcoma of the choroid was discovered.

The case (875, table 1) in which iridencleisis was performed is of interest. The patient, a young male, was found to have bilateral glaucoma with the left eye totally blind and showing a deep excavation of the optic-nerve head, but with vision of 6/5 in the right eye. Iridencleisis was performed on the right eye and eleven days later on the left. The postoperative course was uneventful until nine weeks later when the patient appeared with a low-grade bilateral uveitis. Sympathetic uveitis was not suspected but the patient was hospitalized and vigorously treated with dry heat, salicylates, and foreign-protein injections for three weeks. At the end of this time vision in the right eye was 6/6—1 and inflammation had subsided. The patient was discharged from the hospital but kept under observation. The left eye continued to show evidence of low-grade inflammation and began to soften. It was enucleated 5½ weeks after the onset of uveitis. The right eye, which had seemed quiet and in which vision was 6/6—1 just previous to operation, was found to have a vision of 6/5+ two days after the removal of the left eye. Pathological examination of the left eye disclosed an early sympathetic infiltration. Which was the exciting eye or whether the inflammation in the right eye was sympathogenic cannot be definitely stated. The rapid improvement in the vision of the right eye soon after the removal of the left does, however, speak for a sympathetic process.

*Sympathetic Ophthalmia Associated with Intraocular Tumors:* In two cases a necrotic melanosarcoma of the choroid was discovered in the exciting eye. One of these (48*, table 1) is among the operative group. The other (71, table 1), occurred in an eye which had been subjected to no operation nor injury. That this is not a remarkable finding is illustrated by the fact that Joy reports one such case in his series of forty-one cases of sympathetic ophthalmia, and three of Fuchs's thirty-five cases were attributed to the same cause. In his discussion of the subject Fuchs stated that the impulse to inflammation in the exciting eye is apparently given by the necrosis of the tumor. He further stated that one must always think of choroidal sarcoma in any case where an eye shrinks following spontaneous inflammation, especially if there is no other apparent cause for inflammation and the latter has led to a comparatively rapid shrinking of the eye. In case 71 of this series, enucleation of the exciting eye, performed immediately on discovery of signs of inflammation in the fellow eye, was followed by an obstinate inflammation in the fellow eye which cleared abruptly following the removal of some foci of infection in the paranasal sinuses.

*Sympathetic Ophthalmia in the Presence of Purulent Infections:* Although it is generally conceded to be of infrequent occurrence in sympathetic ophthalmia, purulent infections of the exciting eye characterized three cases. In one of these (76,** table 1), evisceration of the contents of the globe was effected two weeks after a perforating injury by a nail, and seventeen days previous to the outbreak in the fellow eye. Enucleation of the remainder of the exciting eye was performed on the day following the outbreak and the subsequent course was favorable. One of these has been mentioned previously, since a melanosarcoma was discovered in the exciting eye following enucleation. Hypopyon had appeared 24 days after a basal iridectomy was per-

* This case is reported in detail by Tooker, C. W. and Lamb, H. D. Arch. of Ophth., 1924, v. 53, p. 459.

** This case was reported in detail by Shahan, W. E. Amer. Jour. Ophth., 1927, v. 10, p. 120.

formed to relieve an increased intraocular tension. Prodromal signs of disturbance of the fellow eye appeared eleven days later when an increase in refraction was noted. No exudative reaction was found at this time, however, and five more days elapsed before the appearance of ciliary injection and a few deposits on the anterior lens capsule gave evidence of definite involvement of the fellow eye. Treatment of the sympathizing eye was instituted at that time and enucleation of the exciting eye performed the following day. The outcome was favorable. The third case of purulent infection followed cataract extraction. Signs of inflammation with hypopyon formation were found on the fourth postoperative day. Treatment with foreign-protein injections (typhoid bacilli) for twelve days was followed by a subsidence of inflammation in the eye, which became soft. Two-and-one-half months later the patient appeared with the complaint that the eye had been painful for one week. Signs of uveitis of the fellow eye were discovered at that time and enucleation of the exciting eye was advised. Despite the fact that the patient withheld consent for five days, enucleation, performed then, was followed by quick subsidence of inflammation in the sympathizing eye and the outcome was favorable.

## Pathology

*Distribution of Sympathetic Infiltration:* Following the suggestion of Dr. Bernard Samuels in his article on the "Significance of specific infiltrate at the site of injury in sympathetic ophthalmia,"[8] the writer examined the sections of each case as to presence of infiltrate in (1) the wound, (2) the anterior segment of the eye and (3) the posterior segment. For purposes of classification, infiltrate consisting of only small round (lymphocytic or plasma) cells has been classed as *slight*, that containing some epithelioid cells as *moderate*, and that in which epithelioid cells occurred in great numbers in "nests," or in which giant cells occurred, as *intense*. In no case in this classification could infiltration be termed slight in all parts of the uveal tract, since infiltrate specific of sympathetic ophthalmia must contain some epithelioid cells (Fuchs). In addition, the presence of infiltration in the sclera was studied. When present—in our cases scleral involvement was always an infiltration around emissaries—no cases of diffuse scleral involvement, such as described by Samuels,[9] were found, although rather definite, diffuse infiltrate in the episcleral tissues of the anterior segment was not infrequent. Such episcleritis differed in no way from that found in other forms of uveitis, however, since it was characterized by round-cell infiltrate only. But the infiltrate that surrounded the more posterior scleral emissaries was in many cases quite specific in appearance, containing many epithelioid and in some cases giant cells. When present, scleral infiltrate has been classified in the same fashion as that of the uveal tract.

*Infiltrate in Wound:* Of the 16 cases of the favorable group in which sections through the wound were available, six, or 39.5 percent, showed moderate or intense infiltration of the wound. That is to say "specific" infiltrate containing epithelioid cells or giant cells was found in some degree in each of these six wounds.

In the unfavorable group, two, or 18.2 percent, of the 11 cases with sections through the wound showed moderate or intensive infiltrate of specific nature. Of these, one case (34, table 5) displayed the infiltrate to an intensive degree in both the wound of entrance and that of exit of the offending perforating body (lead shot).

In no case in either group was there infiltration at the wound site only, al-

though in case 638 (table 4) an intensive infiltration was found at the wound site and in the choroid, with the iris and ciliary body infiltrated to a lesser extent.

*Infiltrate in Uveal Tract:* The specimens from case 47 (table 4) consisted of only the anterior part of the eyeball and that of case 76 (table 4) of only the external coat, since in these cases evisceration of the contents of the globe had been performed. With these two excepted, comparison of the infiltrative process in the anterior and posterior segments of the uveal tract was possible in each case. Four, or 25 percent of the remaining 16 cases in which the outcome was favorable, showed intensive infiltration in all parts of the uveal tract, while six cases, or 37.4 percent, showed intensive infiltration in some part of the anterior segment (in iris or ciliary body) and in the posterior segment. In the unfavorable group two, or 15.4 per cent, of the cases displayed intense infiltration in the iris, ciliary body, and choroid; and in four cases, or 30.7 percent, infiltration was intensive in the choroid and in at least one part of the anterior segment.

In two cases (12.5 percent) of the favorable group infiltration was intensive in the posterior segment, slight elsewhere; and in two cases the infiltrate was intensive in the anterior segment, slight in the choroid. Intensive involvement of the choroid with slight involvement elsewhere in the uveal tract characterized two cases (15.3 percent) of the unfavorable group; the reverse of this condition was true in five cases (38.4 percent). One case in this latter group exhibited intensive infiltration in the choroid with moderate infiltration in the ciliary body and slight infiltration in the iris.

Apparently little prognostic inference can be drawn from the extent or location of the infiltration in the exciting eye. While it is true that a higher percentage of cases of the unfavorable group did show an intensive infiltration of only the anterior part of the uveal tract, three cases of the group with favorable outcome were distinguished by a moderate infiltration in this part and little elsewhere. One case, however, marks an exception to this conclusion, for the sections from case 569 (table 4), in which there was never any involvement of the second eye, show a slight involvement of all parts of the uveal tract excepting the choroid, and in the latter only infrequent areas displayed epithelioid and giant cells. On the other hand, case 47 (table 4), in which there was no involvement of the second eye, shows intensive infiltration of the ciliary body and a moderate infiltration of the iris (the only parts of the uveal tract available for section).

*Scleral Infiltrate:* Involvement of the sclera by the infiltration of sympathogenic uveitis has been well recognized. Fuchs has reported the frequent occurrence of infiltrate containing epithelioid and giant cells around scleral emissaries, more particularly surrounding the vortex veins, and even stated that a breaking through the sclera by the inflammatory uveal mass is not uncommon in the sympathizing eye (although not common in the exciting eye). Woods[10] states that the early appearance of infiltration around the scleral emissaries in sympathetic ophthalmia is a point of differential diagnosis from ocular tuberculosis. And Samuels has classified the types of scleral involvement commonly found in sympathetic uveitis in the article already cited.

As has been mentioned previously, involvement of the sclera, when present in this series of cases, was always an infiltration surrounding emissaries. In general, the distribution of the infiltrate in each case corresponded to the description given by Woods; that is, infiltration tended to be more intense posteriorly near

areas of intensive choroidal involvement and anteriorly near the limbus where the anterior ciliary vessels penetrate. In no case was definite evidence found of specific infiltration in the extraocular tissues attached to the globe as reported by Samuels, but in some instances the mass of infiltrating cells extended along the entire scleral course of an emissary and could be seen at the external margin of the sclera.

In eight cases (or 47.0 percent of the seventeen cases in which the entire sclera was included in the sections) of the favorable group, infiltration around the scleral emissaries contained epithelioid or giant cells; that is, was moderate or intense. In seven of these cases choroidal involvement was also intense. The other case is that in which the choroid was removed by a previous evisceration operation. Of the cases in the unfavorable group five (38.5 percent) showed moderate or intensive scleral infiltrate, which in one case (4, table 5) was confined to the anterior portion in the region of the canal of Schlemm.

Apparently, then, infiltration surrounding the scleral emissaries in the exciting eye cannot in itself be considered a bad prognostic omen as to the outcome of the inflammation in the sympathizing eye. However, the possibility that the involvement of the scleral emissaries is the source of the inflammation in the fellow eye is suggested by the history in case 76 (table 1) in which a perforation thirty-four days before the onset of inflammation in the second eye was followed by a purulent infection and evisceration of the contents of the globe. This operation was done fourteen days after the injury and therefore preceded the outbreak by twenty days. Whether or not the second eye was involved previous to evisceration it is impossible to state. The short interval between evisceration and onset would indicate that it was, but the finding in the retained sclera of several emissaries surrounded by intense specific infiltration does suggest that involvement of the sympathizing eye may have taken place at some time after the evisceration. This would argue for enucleation rather than evisceration when an eye which has ever suffered a perforating injury must be removed. If, because of a purulent intraocular infection, enucleation is thought to be contraindicated, the possibility of a sympathetic ophthalmia arising from the tissues not removed by evisceration must be considered. Woods states that the characteristic nodules of sympathetic ophthalmia have been found in the intravaginal space, in the optic nerve tissue, and between the fibers of extraocular muscles. Samuels reports a case in which tags of the inferior-oblique muscle, which were attached to an eyeball removed because of sympathetic ophthalmia, contained foci of specific cells. He points out that remnants of orbital tissue adherent to the sclera after enucleation in sympathetic ophthalmia almost always show perivascular infiltration to some degree, and he concludes that "a realization of the likelihood that the specific infiltration may be present outside the globe, especially posteriorly, should make the surgeon careful to excise a long piece of optic nerve and with it the adjoining orbital tissues." He further suggests that in all cases of sympathetic ophthalmia or suspected sympathetic ophthalmia "it would seem to be a good practice" to apply radium therapy to the orbital contents which remain after enucleation. Since it seems a well-established fact that the specific infiltrate of sympathetic ophthalmia may involve not only sclera but also extraocular tissues, the performance of an evisceration in any case where sympathetic uveitis has developed or seems likely to develop would seem to be distinctly hazardous.

Our case 47 offers some contradiction to this, for here evisceration was performed and the changes of sympathetic ophthalmia were found in the excised portion of the eyeball,* yet the second eye never became inflamed. It must be assumed that in this case enough of the involved tissues had been removed by operation to preclude a spread of the inflammation to the fellow eye.

*Pigment Phagocytosis:* In his excellent review of the subject of sympathetic ophthalmia Woods has stated that phagocytosis of pigment granules by the epithelioid cells and giant cells occurs in the early stages of the disease and thus is a point of pathological differential diagnosis from ocular tuberculosis. Friedenwald[11] has given a comprehensive discussion of the microscopic aspects of this phenomenon and has concluded that the taking up of pigment granules by the cells of the specific lesion is a prominent feature of sympathetic ophthalmia and is insignificant in other intraocular inflammatory diseases.

This phagocytosis, according to Friedenwald, might be considered the fulfillment of Koch's first postulate if uveal pigment be considered the specific antigen in sympathetic ophthalmia. He feels that the second postulate of Koch has been satisfied, with uveal pigment as the antigen, by the skin reactions to injection of uveal pigment in cases of sympathetic ophthalmia. The histological characteristics of the skin reaction were found to be indistinguishable from those of the specific lesion. While a discussion of the pathogenesis of sympathetic ophthalmia is not within the scope of this paper, it is felt that any of the pathological findings which would seem to confirm or deny the hypothesis of Friedenwald should be of great interest. To this end the sections of our thirty-two cases were carefully inspected as to the extent of pigment phagocytosis by the epithelioid and giant cells of the infiltrate. The results are given (tables 6 and 7) with accompanying notations as to the distribution in the several parts of the uveal tract. Pigment phagocytosis in the wound and surrounding the scleral emissaria is reported in the cases in which specific infiltrate was found in those regions. As might be expected pigment phagocytosis was in general more marked in those areas where infiltration was intensive, and was slight in the areas where few epithelioid cells were present. It was not true, however, that every area in which infiltration could be classed as intense showed a similar degree of pigment phagocytosis. In case 638 (tables 4 and 6), for example, infiltration was intensive in all parts of the uveal tract and in the wound, and moderate in the sclera, yet pigment phagocytosis was slight in all of these regions.

An analysis of the occurrence of pigment phagocytosis in relation to the final outcome is difficult because of the great variation in the several parts of the infiltrate in any given case. It is true that intensive phagocytosis of the pigment granules was found in at least one region in five cases (27.8 percent) of the favorable group and in only one case (7.6 percent) of the unfavorable group. Moderate pigment phagocytosis occurred in five (other) cases of the favorable group and in six cases (46.2 percent) of the group with unfavorable outcome. Pigment phagocytosis was slight or absent in eight cases (44.4 percent) of the favorable and in six (46.2 percent) of the unfavorable group. Friedenwald mentions a case of an exciting eye, removed five years after the onset of sympathetic ophthalmia, in which the uveal tract was replaced by

* Sections of this case were examined and the diagnosis confirmed by the late Hofrat Ernst Fuchs.

scar tissue and devoid of pigment. This he interprets as indicative that healing of the lesion is accompanied by removal of the antigen; that is, the uveal pigment. The greater incidence of intensive pigment phagocytosis in those cases of our series in which outcome was favorable might be considered as support of this interpretation, the phagocytosis of pigment being regarded as a defense mechanism. However, the more frequent occurrence of moderate pigment phagocytosis in the unfavorable group partially offsets this finding. And, unless evidence is adduced that the degree of pigment phagocytosis in the exciting eye is accompanied, or likely to be accompanied, by a similar degree in the sympathizing eye, few conclusions can be drawn from these findings.

*Changes in the Retinal Pigment Epithelium* (tables 6 and 7): In his paper dealing with the phagocytosis of pigment as indicating an allergic pathogenesis of sympathetic ophthalmia, Friedenwald has stated that allergy to uveal pigment alone is not sufficient to produce the disease. This is evidenced by the fact that a false positive reaction to the injection of uveal pigment has occurred. Another factor which should render the pigment available for allergic reaction is necessary, and this factor is suggested to Friedenwald by the proliferation of the cells of the retinal pigment epithelium. Presumably, when such cells proliferate they become vulnerable to antibodies and undergo autolysis, releasing melanin granules which elicit the allergic inflammatory reaction. Such proliferation of the retinal pigment epithelium is well illustrated by the Fuchs-Dalen nodule, which is frequently present in sympathetic ophthalmia. Friedenwald's explanation of the development of the Fuchs-Dalen nodule differs, however, from that of Fuchs; for Fuchs has stated that these nodules result from the proliferation of the cells of the retinal pigment epithelium, some of which lose their pigment and some of which take an epithelioid form. He mentions that lymphocytes may wander through an intact glass membrane to become included in the nodule, but no specific mention is made of epithelioid cells migrating from the choroid into the nodule. Friedenwald has explained the Fuchs-Dalen nodule as the result of the dissolution of the pigment-bearing cells followed by invasion of epithelioid cells and giant cells which "pick up the pigment." A druse, according to Friedenwald, is related to the Fuchs-Dalen nodule, since it develops as the result of proliferation of the retinal pigment epithelium, but, in the absence of specific infiltrate in the choroid, hyalinization instead of invasion of epithelioid cells has occurred.

The writer does not believe the ideas of Fuchs as regards the Fuchs-Dalen nodules to be necessarily antagonistic to Friedenwald's hypothesis of an allergic pathogenesis of sympathetic ophthalmia; for the absence of epithelioid cells in the Fuchs-Dalen nodule does not necessarily lessen the significance of pigment phagocytosis in the choroid. Proliferation of the cells of the retinal pigment epithelium, which is essential to Friedenwald's hypothesis, is described by Fuchs. Of course the important testimony offered by epithelioid cells in taking up pigment at the site of the proliferation is lacking if Fuchs's description is accepted.

In our cases, changes in the retinal pigment layer were mainly of three varieties. Proliferation of the pigment-bearing cells with the consequent formation of Fuchs-Dalen nodules was found in two cases. Disintegration of the retinal pigment epithelium associated with specific infiltrate, which had apparently migrated from the choroid to break through the

pigment layer, characterized six cases. A similar disintegration of the retinal pigment epithelium in regions where the choroid displayed only round-cell infiltration was found in three specimens. In addition to these, two cases showed specific infiltrate displacing an intact retinal-pigment layer inward, and two cases showed a similar displacement by round cells. In nine of the fifteen cases in which the retinal-pigment layer was altered the changes were observed only near the ora serrata. It is at the ora serrata that the retina is firmly attached. In each of these (nine) cases the retina was detached within the area of involved pigment epithelium which was just posterior to the place of retinal attachment. This would suggest that the pulling away of the retina, which was probably attended by more trauma in this region than elsewhere, so affected the retinal pigment epithelium as to permit of the described changes. The lamina vitrea was microscopically intact external to the area of retinal-pigment change in seven of the fifteen cases. This condition, which has been mentioned previously as one of the observations of Fuchs, offers some evidence that the glass membrane is no barrier to the inward migration of cellular infiltrate.

In one case (1156, table 6), several large drusen were discovered underlying areas of the choroid which were heavily infiltrated with specific cells. This case stands as contradictory evidence to the hypothesis of Friedenwald, since here no invasion of epithelioid cells followed proliferation of pigment-bearing cells. The nodular protrusions of specific infiltrate displacing or breaking through a disintegrated retinal-pigment layer might conceivably be considered a Fuchs-Dalen nodule in which little dissolution of pigment had occurred. This is not suggested by their appearance, however, for the great resemblance of the infiltrate to that in the overlying choroid and the infrequency of pigment-containing cells within the nodule indicate that an extensive choroidal infiltration is the mode of production.

It will be noted that four specimens showed disintegration of the retinal pigment epithelium beneath areas of choroid in which there was no specific infiltration. Furthermore, the Fuchs-Dalen nodules appearing in two cases were in regions where choroidal infiltrate consisted of round cells only. The latter condition is mentioned by Fuchs. Disintegration or proliferation of the retinal pigment epithelium is, then, not dependent upon specific infiltration in the region. Whether or not the choroid would later become heavily infiltrated in these regions and the epithelial lesions become invaded by the specific cells cannot be stated. The late stage of sympathetic ophthalmia demonstrated in lesions elsewhere in the same specimen, in many cases, would not suggest it.

In comparing the involvement of the retinal-pigment layer in cases with favorable and unfavorable outcome, the case showing drusen is omitted, since that lesion, while proliferative in nature, is of common occurrence in other conditions. Nine cases, 50 percent, of the favorable group and five cases, 38.6 percent, of the unfavorable group displayed some change in the retinal pigment epithelium. This comparison is of interest merely because it demonstrates that involvement of the retinal pigment epithelium does not necessarily affect prognosis as to the outcome in the second eye.

*Eosinophiles in Infiltrate:* The occurrence of eosinophiles in the infiltrative process is mentioned by Friedenwald.[12] In this series, one case (48, table 4) showed this phenomenon to an extensive degree. Sections of this eye, which con-

tained a melanoscarcoma of the choroid, showed many polymorphonuclear and mononuclear eosinophiles mingled with lymphocytes and plasma cells in all parts of the uvea, in the wound tract, and composing the hypopyon in the anterior chamber. Mononuclear eosinophiles, which were termed plasmacytoid cells by A. Fuchs (Arch. f. Ophth., 1920, v. 103, p. 228), are presumably derivatives of plasma cells. These cells appeared in great numbers in the infiltrated uveal tract in another case (47, table 4) and were associated there with Russel bodies which are themselves considered to be degenerative products of plasma cells. No prognostic significance is inferred from their appearance in the infiltrate.

## Treatment

While treatment of the inflammation in the fellow eye is not one of the primary considerations of this paper, three cases of unusual interest from this standpoint bear mention. The eye in case 71 had responded poorly to various forms of local and general therapy until foci of infection in the paranasal sinuses were eradicated, whereupon the inflammation subsided almost immediately. Case 1434 was characterized by an unfavorable course until ultraviolet irradiation of the body (with sunlight) was instituted, after which the eye improved greatly. Similarly the eye in case 1491, treated by ultraviolet irradiation, had a rapid favorable course to subsidence of inflammation. Treatment in the latter two cases was based upon the suggestion of Friedenwald that proliferation of the pigment-bearing cells of the skin should provide the body with a desensitizing agent if pigment is the specific antigen. Whether irradiation or some coincidental form of therapy was the determining factor in improvement in these cases cannot be stated with certainty. The facts are, however, that these cases improved soon after receiving the treatment, which is one form of treatment given in no case with an unfavorable outcome.

## Conclusion

In a study of thirty-two cases of sympathetic ophthalmia, in each of which diagnosis was confirmed by microscopic examination of the exciting eye, it was found that:

1. Sympathetic ophthalmia does occur, and not rarely, in persons over sixty years of age. 2. Perforating injuries and outbreak of sympathetic ophthalmia were twice as frequent during the period between October and April as between May and September. 3. Sympathetic ophthalmia may follow nonperforating injuries, and may develop in the absence of trauma when a necrotic intraocular tumor is present. 4. A soft, shrinking exciting eye with greatly impaired (or totally lost) vision is usually found at the time of outbreak of inflammation in the fellow eye, the vision of which may not be impaired. 5. Perforating wounds in the cornea or at the limbus are no less dangerous than wounds in the ciliary body from the standpoint of sympathetic ophthalmia. Especially liable to result in sympathetic inflammation are eyes with unhealed wounds in any region. 6. While the interval between injury and outbreak does not seem to be an important factor in the outcome of the secondarily affected eye, a protracted interval between the onset of sympathetic inflammation and removal of the exciting eye affects unfavorably the outcome in the fellow eye. By the same token, enucleation of the exciting eye affects favorably the prognosis for the other. 7. Photophobia, lacrimation, ciliary injection, cells in the aqueous, and deposits on the posterior corneal surface or on the anterior lens capsule, these, frequently accompanied by some visual impairment, are among the most common

early findings in the sympathizing eyes. But neuroretinitis in the uninjured eye may be the earliest sign of an impending sympathetic inflammation, and a sudden increase in refraction may precede more definite signs of inflammation in the sympathizing eye by as much as five days. 8. Sympathetic ophthalmia may develop following iridencleisis and may develop in the presence of panophthalmitis. 9. While the extent of the specific infiltrate surrounding the scleral emissaries is not of great prognostic significance, evisceration of the contents of the globe probably does not protect against transfer of sympathetic uveitis to the fellow eye. Even when enucleation is performed it is probably wise to remove as much of the optic nerve and extraocular tissues attached to the globe as is feasible. 10. The prognosis in the case of the sympathizing eye cannot be safely based upon the extent or location of the specific infiltrate in the exciting eye. 11. Phagocytosis of pigment by the epithelioid cells of the infiltrate occurs in some degree in sympathetic ophthalmia, but the Fuchs-Dalen nodule is not necessarily the site of this activity. 12. The extent of pigment phagocytosis or of change in the retinal pigment epithelium in the exciting eye does not affect the prognosis for the sympathizing eye. 13. Eosinophiles and plasmacytoid cells may compose part of the infiltrate in sympathetic ophthalmia. 14. Removal of foci of infection and ultraviolet irradiation of the body may offer valuable means of combating sympathetic ophthalmia.

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# CHRONIC TRAUMATIC SUBDURAL HEMATOMA AS A CAUSE OF CHOKED DISC*

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Frequent references are found in the general literature to a group of patients who develop symptoms of intracranial pressure at varying intervals after a trauma to the head, and who are found, either by operation or at autopsy, to have an organizing blood clot beneath the dura. Ocular symptoms, especially choked disc, are frequently observed in connection with chronic subdural hematoma. Despite this fact, no significant consideration has been given to it in the ophthalmic literature. Not infrequently such patients first seek relief at the hand of the ophthalmologist, or are referred to him in consultation. If the presence of subdural hematoma is recognized or even suspected, appropriate surgical intervention often results in a complete cure. If the condition is unrecognized, and therefore not properly treated, permanent disability or death may ensue. For these reasons a report of a case of chronic subdural hematoma with choked disc, together with a reference to its salient features as described in the literature, would seem to be justified.

## CASE REPORT

The patient, M. R., a white female, aged 30 years, was first seen September 10, 1935. Her chief complaint was of blurred vision in the right eye, which had first been noticed two weeks previously. She had suffered from headache, accompanied by nausea but no vomiting, at intervals for three years. Five weeks previously, she had fallen on her face.

*Ocular Examination:* The external parts of both eyes were normal, as were also the pupillary reactions. The fundus examination of the right eye revealed choked disc of approximately 2.5 diopters. The fundus of the left eye was normal. The visual acuity and refractive findings under homatropine were as follows: In the right eye, with a +2.00 D. sph. vision was 20/40—1; in the left eye, with a +1.75 D. sph. ⊂⊃ +.25 D. cyl. ax. 90° vision was 20/20. The fields of both eyes were normal for form and color. The blind spot in the right eye was enlarged; in the left eye the blind spot was normal. The muscle balance was normal. No diplopia was elicited.

A general physical examination by the patient's physician, Dr. Donald Cavanaugh, was negative. The patient was referred to Dr. Howard McIntyre for a neurological examination. During a subsequent two weeks' stay in the hospital, careful detailed neurological examinations failed to reveal any evidence of focal neurological disease. A general physical examination at the hospital was also negative. An X-ray film of the skull was negative. A spinal puncture revealed normal pressure. The spinal-fluid Wassermann reaction was negative. The cellular content of the spinal fluid was normal, and the gold curve was negative. The patient was referred to Dr. William Mithoefer for a nasal examination. There was some ethmoid and tonsillar involvement which was not considered signifi-

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cant. An X-ray film of the sinuses was negative.

The patient continued to complain of headaches of increasing severity, and by October 8th these had become almost constant. On this day another complete neurological study yielded the following findings: The deep reflexes were hyperactive in the right arm and in the left leg. There was a bilateral Chaddock and Strümpell sign, which was a trifle more pronounced on the left side. The abdominal reflexes were diminished and the muscles on the left side were easily fatigable. These signs persisted, and as an expanding intracranial lesion was suspected, it was decided to do a ventriculogram.

At this point it is well to note the bilateral character of the neurologic findings, which is quite commonly observed in subdural hematoma. The fact that the deep reflexes were hyperactive in the right arm was offset by the fact that they were also hyperactive in the left leg. The pyramidal signs were bilateral, although a trifle more marked on the left side, as was evidenced by the more pronounced Chaddock and Strümpell sign on the left, together with diminished abdominal reflexes on the left. The weight of the neurological evidence pointed toward an expanding right supratentorial lesion. However, this evidence was so slight that it was deemed wiser to do a ventriculogram than to turn down an osteoplastic flap on the right side.

On October 15th, a ventriculogram was undertaken by Dr. B. Nolan Carter. A trephine opening was made to the right of the occipital protuberance. On introducing the ventricle needle, a collection of coffee-colored fluid was obtained. It was obvious that a subdural hematoma was present. By through-and-through irrigation the clot was removed. The patient improved rapidly, made an uneventful recovery, and was discharged from the hospital on October 31st. The choked disc gradually subsided. When last seen on January 10, 1936, the disc in the right eye was practically normal. The vision was 20/30.

## Discussion

Subdural hematoma may be described as a circumscribed collection of blood in the subdural space with certain definite gross and microscopic characteristics. Descriptions of the gross appearance of subdural hematoma have been found in the literature from the earliest times. To the investigations of Virchow[1] in 1857, we owe our first accurate knowledge of the gross and microscopic pathology of this form of hematoma. This investigator gave the name pachymeningitis interna chronica to the fibrinous exudate and its organization which he observed on the inner surface of the dura; if extravasation was marked in the tissue, he termed it pachymeningitis hemorrhagica. In 1925 Putnam,[2] in a noteworthy study, divided subdural hemorrhages into two groups; namely, pachymeningitis hemorrhagica interna and chronic subdural hematoma. Pachymeningitis hemorrhagica occurs spontaneously in patients with some general constitutional disease and may be masked by its symptoms. Chronic subdural hematoma is a clear-cut clinical entity, definitely connected with trauma, and accessible to surgery. The gross appearance of these types is similar. According to Putnam they can be differentiated microscopically. It is only in the last decade that widespread clinical interest concerning chronic subdural hematoma has been aroused, because of the recognition of the importance and necessity of surgery in connection with it.

Etiology. Traumatic subdural hematoma occurs as the result of the tearing of one or more of the short cerebral veins communicating with the sagittal sinus.

When this tearing takes place, there occurs a slow oozing of blood over a portion of one or both hemispheres between the dura and the arachnoid, with the subsequent formation of a thin clot of varying size. The trauma is usually slight, and the history frequently reveals that the force of the blow has been exerted in an anteroposterior direction. The displacement of the brain lacerates a vessel communicating with the immobile sinus. No entirely satisfactory explanation has been found for the predominance of slight trauma as an etiological factor. Putnam suggests that an injury severe enough to cause edema of the brain may cause a tamponing of a torn vein and in this way prevent hemorrhage.

*Age of Incidence.* Subdural hematoma occurs most frequently in males in the fourth or fifth decade. It has occurred in children.

SYMPTOMS. One of the peculiarities of this condition, and one that has not been satisfactorily explained, is that there is a "latent interval" between the trauma and the appearance of the symptoms. This interval may vary from days to years.

*General Symptoms.* There is a great variability in the symptoms as well as a marked fluctuation in their severity. According to Putnam, they are divided into those due to intracranial pressure (headache, vomiting, vertigo, slow pulse, choked disc), those due to local pressure (paralyses, rarely sensory disturbances, spasticity, convulsions, aphasia), and those due to irritation (Kernig's sign, stiff neck). They are often atypical and frequently misleading. Homolateral hemiplegia may occur. Bilateral symptoms may be evoked by a unilateral lesion or vice versa. According to Gardner, the occurrence of increased intracranial pressure with normal spinal puncture is quite characteristic. This observer ascribes the incidence of homolateral signs to dislocation of the brain, with consequent pressure on the cerebral peduncle by the incisura of the tentorium.

*Special Symptoms.* The mental state is frequently abnormal. Thus alterations in personality, emotional instability, or maniacal episodes may constitute the initial symptoms. Drowsiness is common. The most constant symptom is headache, frequently accompanied by nausea or vomiting. Focal symptoms may be absent or slight. Convulsions, sensory disturbances, hemiparesis, dysphasia and hemianopia may occur. Choked disc is of frequent occurrence. Its approximate incidence will be referred to later. Pupillary disturbances may manifest themselves in the form of areflexia, aniscoria, or miosis. According to Kaplan,[3] ipsolateral dilatation of the pupil is a localizing sign of value. Conjugate deviation, ptosis, and strabismus have been reported.

DIAGNOSIS. The occurrence of headaches, mental symptoms, and drowsiness, with or without focal symptoms, in a case with a previous history of trauma, suggests the possibility of subdural hematoma and provides the indications for surgical intervention. In doubtful cases, a ventriculogram is indicated and may serve to determine whether the process is unilateral or bilateral. It may be particularly difficult to differentiate subdural hematoma from brain tumor, cerebral vascular disease in an elderly patient, or alcoholic dementia.

TREATMENT. When the presence of a subdural hematoma is suspected, a small trephine opening should be made in the frontoparietal region on both sides, because of the frequency of a bilateral lesion. The dura is observed and, if necessary, incised, and the subdural space examined. If a hemorrhage is found, opinions differ as to whether an osteoplastic resection should be made, with or without a subtemporal decompression, or

whether through-and-through irrigation should be employed through openings in the frontoparietal and parietoöccipital regions.

SURGICAL PATHOLOGY. Chronic subdural hematoma is bilateral in from one third to one half of the cases. It is situated, with rare exceptions, above the tentorium, and usually in the parietal region. It may be small, or it may be large enough to effect a considerable displacement of the brain. The dura over the hematoma has a characteristic greenish color which facilitates its surgical recognition. The contents of the sac, if fluid, are usually coffee colored. The hematoma is completely enveloped in a membrane of fibrous tissue. On the inner surface, in contact with the arachnoid, the membrane consists of a thin connective-tissue layer lined with mesothelial cells. It is nonvascular and not attached to the arachnoid. The outer layer varies in thickness from 1 to 4 mm. and is made up of fibrous tissue. Columns of fibroblasts, arising from this membrane, invade the hematoma. A few fine vessels enter the clot from the membrane. The most peculiar and characteristic feature of the outer layer of the enclosing membrane is the presence of elongated spaces lying parallel to the dural surface. These spaces are lined with mesothelium.

Much mystery attaches to the peculiar way in which the clot organizes and to its delayed relation to trauma. Gardner[4] believes that expansion of the hematoma may take place by dilution of the contents of the sac by osmosis of cerebrospinal fluid. He confirmed this possibility experimentally. His ideas have been accepted as valid by Munro and Merritt[5] and by Zollinger and Gross.[6] Munro and Merritt have recently classified subdural hematoma into three types: the solid, the mixed, and the fluid hematoma. The solid form is nonexpansible. These observers believe that the thickness and the characteristics of the membrane may afford an index as to the age of the clot, and may have medicolegal significance. The mixed form contains free fluid as well as organizing clot attached to the dura. The age of the clot may be approximately fixed by a study of the protein contents of the sac. These mixed hematomas are expanding lesions for three months, after which they become stationary. The third (fluid) type of subdural hematoma contains no clots. It presents two varieties: (1) a subdural collection of a little blood mixed with a larger amount of cerebrospinal fluid at the time of injury; (2) subdural collections of old fluids from which the original blood has been completely dissolved. According to the investigations of Munro and Merritt, as well as of Zollinger and Gross, expansion in the hematoma terminates at the latest at the end of several months. Some further explanation to account for the protracted latent interval in the development of symptoms in some cases must be found. In solid hematoma, according to Leary,[7] the histological changes result from the incomplete removal of the clot of blood, owing to the unique anatomical peculiarities of the subdural space. Leary believes also that the formation of large blood spaces in the outer wall of the clot is peculiar to subdural hematoma. He contends that the dilatation of these vascular spaces is due to back pressure which results from the inadequate venous outflow in the dura. Leary asserts that the inability of the relatively avascular dura to organize the subdural clot efficiently and the resulting secondary hemorrhage are responsible for the chronicity of many cases.

A survey of 224 cases reported in the literature which was available revealed an incidence of choked disc in approximately 44 percent of the cases.

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# EXPERIMENTAL "EXOPHTHALMOS" IN DOGS

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By the use of a simple instrument of original design, a condition of enophthalmos or exophthalmos can be ascertained with a reasonable degree of accuracy in the normal as well as in the anesthetized dog. Pentothal sodium, sodium amytal, pentobarbital, and chloralose administered intravenously cause a marked enophthalmos, while surgical ether anesthesia produces a slight exophthalmos. Sympathomimetic drugs cause little or no change in the position of the eye of the unanesthetized dog. In animals anesthetized with sodium amytal and related drugs, ephedrine and tyramine when administered intravenously cause the eye to advance almost to the position held before anesthesia. Thus the so-called "exophthalmos" reported in the literature as resulting from injections of sympathomimetic drugs is more correctly explained as an advancement of the eye to its normal position from a condition of enophthalmos. The eyes of animals made thyrotoxic behaved in every respect as did those of normal controls. From the Division of Experimental Medicine of the Mayo Foundation.

There are a considerable number of papers in the literature on the subject of exophthalmos in laboratory animals, but in all of them that we have reviewed, with a single exception, the investigators relied largely on subjective impressions as to the degree of exophthalmos.[1-5] Brunton,[6] by a system of levers, made kymographic records of the changes in position of the eye of the dog resulting from the injection of appropriate drugs. A high percentage of the observations made by previous investigators have been on animals under general anesthesia.

Only casual observation is necessary to convince one that such anesthetics as sodium amytal, pentobarbital sodium, and chloralose, given intravenously, cause marked enophthalmos, and that ether anesthesia either causes little change in the position of the eye or produces only mild exophthalmos. More accurate measurements of the position of the eye before and during general anesthesia were considered imperative if proper appraisal was to be made of the effects on the eye of sympathomimetic drugs such as epinephrine, ephedrine, tyramine, and so forth. The desirability of constructing a simple apparatus for measuring exophthalmos or enophthalmos of the dogs was apparent. Consequently, with the assistance of Dr. W. L. Benedict such an instrument was devised, and it has been used in obtaining the data reported in this paper. We have been concerned with the position of the eye of the normal dog, and of the dog rendered thyrotoxic by the ad-

ministration of desiccated thyroid gland, before and during general anesthesia. Attention has also been paid to the response of the eyes of such animals to certain drugs and to vagosympathetic stimulation.

## Methods

*Instrument* (figure 1). The metal used in constructing the apparatus is about 5 mm. wide and about 1 mm. thick. In its essential features the instrument consists of an L-shaped bar, the long arm of which is calibrated in millimeters. On the long arm is attached a sliding arm equal in length to the short arm of the L-shaped bar. Between the two short arms is a bar or finger, also calibrated in millimeters, which moves in a plane at right angles to the long arm of the L-shaped bar. In making measurements the short arms are placed, one against the upper bony orbital ridge and the other against the zygoma. The instrument is held at an angle of about 45 degrees to the sagittal plane of the dog's head and in such a manner as to bring the long arm of the L-shaped bar at right angles to the palpebral fissure. The arms can be set at appropriate positions for various-sized dogs. When the arms have been placed in the desired position, and after the instrument has been properly aligned, the finger is set so that when moved forward it makes light contact with the outermost surface of the cornea, after which the position of the eye is read in millimeters. The instrument can be used on unanesthetized as well as anesthetized dogs.

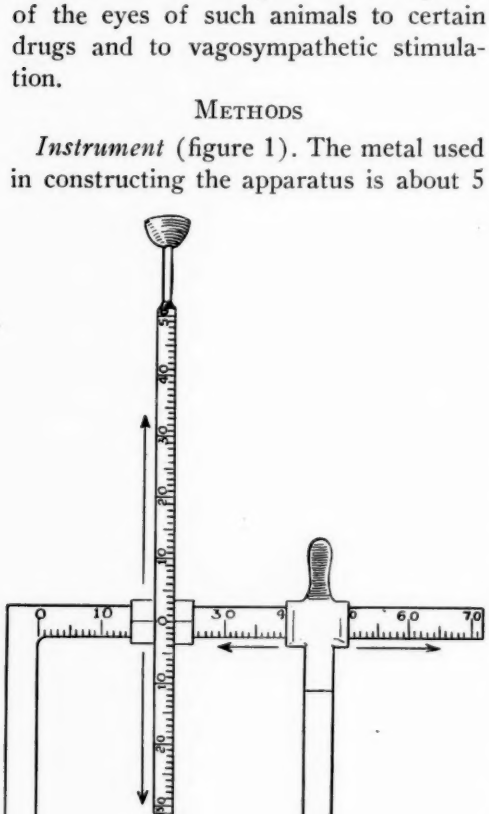


Fig. 1 (Essex and Corwin). Instrument used for measuring the degree of enophthalmos or exophthalmos in the dog.

We have considered that exophthalmos is present when the eye protrudes beyond the normal position, which has previously been determined, and that enophthalmos has resulted when the eye is retracted below its previously determined position. Our measurements indicate changes in either direction from the normal. The accuracy of the method is not greater than 1 mm.

Experimental thyrotoxicosis was produced by feeding the animals daily 0.3 gm. per kilogram of body weight of desiccated thyroid gland for a period of six weeks before they were used in the experiments.

Unless otherwise stated in the paper, the dose of ephedrine given in each experiment was 1 mg. per kilogram of body weight and the dose of tyramine was 2 mg. per kilogram, both given intravenously.

## Results

*Anesthetics given intravenously.* Since general anesthetics were used in previous studies of a similar nature, we have studied the effects of certain anesthetics given intravenously on the position of the eye: (1) Pentothal sodium caused an average enophthalmos of 4.3 mm., as determined by 24 measurements on three normal dogs; (2) sodium amytal pro-

duced an average enophthalmos of 2.35 mm., which figure was obtained from 20 measurements on one animal, and (3) eight measurements on one animal under chloralose anesthesia showed an average enophthalmos of 5.2 mm.

The fact that a dog is in a thyrotoxic state does not prevent the occurrence of enophthalmos under anesthesia, since pentothal sodium anesthesia produced an average enophthalmos of 3.7 mm. (average of 40 measurements on three dogs) and, under anesthesia with pentobarbital sodium, an average of 10 measurements on the same animal gave an enophthalmos of 3.5 mm.

The reports of Justin-Besançon and others from the laboratory of Professor Labbé stimulated our interest in the effect of ephedrine and tyramine on the position of the eye when these drugs were given to normal and to thyrotoxic dogs, without anesthesia and then under a general anesthetic. Under pentothal sodium anesthesia, tyramine caused the eyes of three otherwise normal dogs to recover from enophthalmos and to advance to within 0.61 mm. of their normal position. This figure resulted from an average of 26 measurements. The effect of tyramine had disappeared in about six to eight minutes. We did not observe a change in the size of the pupil following injections of this drug.

Sixteen measurements on two thyrotoxic dogs under pentothal sodium anesthesia in response to an injection of the same drug resulted in an average protrusion of the eye to within 0.50 mm. of the position held before the anesthetic was administered.

It will be seen that whether the dogs were normal or hyperthyroid, injections of tyramine did nothing more than cause the eyes to advance to about the preanesthetic position. Such a result could hardly be called exophthalmos.

Results of a similar nature were obtained following injections of ephedrine, with the animals under pentothal sodium anesthesia, except that the average of 24 measurements on three thyrotoxic dogs indicated that the eyes advanced 0.48 mm. beyond the position established before anesthesia was induced. Such a degree of exophthalmos is not sufficient to be of significance.

*Ether anesthesia.* Twenty-two measurements on two normal dogs during surgical anesthesia with ether revealed an average protrusion of the eye of 1.5 mm. beyond the preanesthetic position. Ether anesthesia plus tyramine caused the eyes to protrude on the average 2.4 mm. This figure was obtained from 12 measurements on two dogs.

Although doubtless slight exophthalmos resulted from the injection of tyramine into animals under ether anesthesia, it would not be judicious to labor the point in view of the difficulty in a series of dogs of being very positive about the exact depth of ether anesthesia. Variations in the depth of ether anesthesia could conceivably result in differences of this magnitude. Furthermore, the difference in the results amounts to little more than the error of the method.

*Tyramine, without anesthesia.* We were next led to investigate the effect of tyramine on the position of the eyes of unanesthetized normal dogs as compared with unanesthetized thyrotoxic dogs. Thirty-eight measurements were made on the eyes of five normal dogs, which showed an average protrusion of 0.8 mm. beyond the position held before the injection of tyramine. The average of four measurements on one thyrotoxic dog in response to the same dose of tyramine was 0.7 mm.

*Ephedrine, without anesthesia.* An average of eight measurements on two normal dogs showed that the eyes were ad-

vanced 1.1 mm. beyond their pre-injection position. It is apparent that whether the animals are anesthetized or unanesthetized, a very significant exophthalmos does not follow injection of tyramine or ephedrine.

*Electrical stimulation.* Measurements were made on the eyes of a normal unanesthetized dog, after which anesthesia with pentobarbital sodium was given, which resulted in a distinct enophthalmos of 3.5 mm. The right vagus nerve was isolated and sectioned in the neck. Measurements were then made on the right eye during central vagosympathetic stimulation with the inductorium set at 8 cm. An average of 10 measurements showed that the eye advanced 1 mm. beyond the position maintained before anesthesia was induced. Injections of the usual dose of tyramine produced results identical to those of electrical stimulation, and were of comparable duration, six to eight minutes.

Observations on the muscular cone of the eye, exposed after the manner of Code and Essex,[7] showed that tyramine produced constriction of the cone identical to that seen following vagosympathetic stimulation or injections of ephedrine.

At the suggestion of Dr. Walter M. Boothby, subcutaneous injections of tyramine were given daily to one normal and to one hyperthyroid dog for 14 days. The injections were given as follows: 2 mg. per kilogram body weight for two days, 3 mg. per kilogram body weight for five days, 4 mg. per kilogram for two days, and 5 mg. per kilogram for five days. A total of 260 mg. per kilogram was given over a period of 14 days without producing any change in the position of the eye in either animal.

In agreement with previous workers, we found that the development of marked thyrotoxicosis by feeding desiccated thyroid gland did not produce perceptible exophthalmos.

## Comment

This series of experiments indicates that the so-called exophthalmos reported by previous workers as resulting from sympathomimetic drugs is more correctly explained as advancement of the eye to its normal position from a condition of enophthalmos caused by the anesthetic. Chloralose, the anesthetic commonly used in previous investigations, gave the most profound enophthalmos we have seen of any of the intravenous anesthetics used.

## Summary and Conclusions

Measurements on the position of the eye made by the use of a simple instrument have shown that: anesthetics such as pentothal sodium, sodium amytal, pentobarbital sodium, and chloralose, administered intravenously, cause marked enophthalmos; surgical ether anesthesia produces slight exophthalmos; and ephedrine, tyramine, and electrical stimulation of the vagosympathetic nerve of dogs anesthetized with certain intravenous anesthetics cause the eye to advance almost to the position seen when the animal is in a conscious state.

In the unanesthetized animal, ephedrine and tyramine in appropriate doses do not produce an exophthalmos worthy of note.

Tyramine causes the muscular cone of the eye of a dog under anesthesia with pentobarbital sodium to constrict in an identical manner and for a period comparable to that resulting from electrical stimulation of the cut vagosympathetic nerve.

Repeated daily doses of tyramine do not cause exophthalmos in normal or experimentally thyrotoxic dogs.

*The Mayo Foundation.*

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# TOTAL LIPIDS OF HUMAN CATARACTOUS AND SCLEROSED LENSES*

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In the study of the lipid content of crystalline lenses, most investigators have devoted their attention chiefly to cholesterol and lecithin. There are, however, a few reports showing that cholesterol and lecithin constitute only a part of the total lipids found in crystalline lenses. This is seen from the fact that the total amount of lipids extracted from the lenses is usually greater than the sum of the amounts of cholesterol and lecithin.

Earlier reports mention only the fat content of the lenses, which must mean the sum total of all lipoid substances extracted by certain fat solvents. The earliest reports were published in 1840, one by Berzelius,[1] and one by Simon.[2] Berzelius employed alcohol as the solvent, and apparently worked with normal ox lenses. By this procedure he obtained a quantity of fat equal to 2.4 percent of the wet weight of the lenses. This fat, he states, contained traces of salts. Simon extracted the fat from ox and horse lenses, first with sodium chloride and other salt solutions and then determined the fat content of this extractive. The fat amounted to 0.045 percent for oxen, and 0.142 percent for horses, on the basis of the wet weight of the lens material.

In 1868, Kühne[3] published a value of 2.0 percent of fat for crystalline lenses, presumably of oxen, but did not describe the method of extraction. Judging from the fact that this value closely agrees with that obtained by Berzelius, he must have used alcohol as the solvent. Kühne stated that the fat was contaminated with traces of cholesterol, which indicates that in his terminology fat did not include cholesterol. All subsequent investigators speak of fat as a group of lipids other than cholesterol and lecithin; it is supposed to consist chiefly of glycerides of fatty acids. According to Łaptschinsky (1876)[4] the total lipids of normal ox lenses vary between 0.41 and 1.20 percent, with an average of 0.74 percent wet weight, of which

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cholesterol constitutes 0.22 percent, lecithin 0.23 percent, and fat 0.29 percent. The method of analysis is not described, but from the context it appears that the lipids were extracted with alcohol. Cahn (1881)[5] analyzed human lenses, both cataractous and normal, for all three lipid fractions, i.e., cholesterol, lecithin, and fat, and found cataractous lenses to be richer in lipids than normal lenses, especially with respect to cholesterol and lecithin. The analytical results of one group of cataractous lenses, on the basis of dry weight, are as follows: cholesterol 4.55 percent, lecithin 0.803 percent, fat 1.19 percent, a total of 6.543 percent. Another group of cataractous lenses gave still higher values for cholesterol and lecithin but contained no fat. The values for the two lipid fractions are given as 6.22 percent and 4.52 percent, respectively, a total of 10.44 percent. On the other hand, normal human lenses, according to Cahn, contain 0.63 percent cholesterol, 0.63 percent lecithin, and 0.79 percent fat, a total of 2.04 percent. Cahn, as his predecessors, seems to have used alcohol in extracting the lipids. In 1885 Hoppe-Seyler[6] published the results of his investigations of the alcohol extractives of ox and sheep lenses. The average value of these extractives is given as 0.52 percent dry weight. Some twenty-two years later (1907) Gross[7] carried out a thorough analysis of the lipid contents of both normal bovine and cataractous human lenses. He dried the lenses first to constant weight at a temperature of 110°C., then extracted the lipids with ether. The ether-soluble substances in calf lenses varied between 0.47 and 0.99 percent with an average of 0.63 percent dry weight. In lenses from old cows, above 13 years of age, the ether extractives varied between 0.47 and 0.75 percent, with an average of 0.59 percent dry weight. The results which Gross obtained on cataractous lenses, removed by the extracapsular method, are as follows: 2.55 percent for one group and 3.20 percent for another group of lenses in terms of dry weight. The cholesterol contents of the groups of lenses varied accordingly; i.e., 0.44 percent and 0.52 percent, respectively. In 1922 Goldschmidt[8] studied the lipids of human cataractous lenses. After drying a number of lenses to constant weight at a temperature of 37°C., he extracted the lipids with ether. The total ether-soluble substances amounted to 0.35 percent dry weight. The residue he extracted successively with alcohol, benzol, and acetone and obtained an additional amount of 4.04 percent of extractives, or a total of 4.39 percent dry weight. The amount of cholesterol was found to constitute 0.83 percent of the dry lens substance. Goldschmidt concluded that, in order to extract all the lipids from dried lens tissue, one must use, in addition to ether, several other fat solvents, such as alcohol, acetone, benzol, and petroleum-ether. He then made a study of the lipid constituents of post-mortem human lenses from infants less than one year of age to adults seventy-five years old. A total of 314 such lenses was analyzed, all were removed in toto, and the results expressed in terms of the dry weight. After the lens material had been dried to constant weight at a temperature of 37°C., he extracted it with alcohol, then successively with petroleum-ether, acetone, and benzol. The most noteworthy feature disclosed by Goldschmidt's analysis was the fact that the lipid content of crystalline lenses increased with age. Lenses from infants less than one year of age gave an average of 2.12 percent total lipids, whereas those between the ages of 1 year and 10 years gave an average of 6.14 percent. After the age of 20 years the increase continued at a somewhat reduced rate, but reached a value of 8.35 percent in the eighth decade, i.e., between the ages of 70 and 75 years.

In 1931, in conjunction with the study of the cholesterol and phospholipid contents of both normal bovine and cataractous human lenses, the present writer[9] determined the amount of saponifiable fat in the ether-alcohol extract of a few cataractous human lenses. At that time no distinction was made between intra- and extracapsular lenses. The amounts of saponifiable fat, as estimated by the nephelometric method, were found to vary between 1.53 and 4.0 percent, the average being 2.8 percent on the basis of wet weight. This is a much higher value than the sum of the average values for cholesterol (0.61 percent) and lecithin (0.99) percent) determined at the same time on a larger number of similar lenses. This value also closely agrees with that for total lipids obtained by Goldschmidt on post-mortem lenses of old people. Therefore "saponifiable fat" may be roughly regarded as equivalent to total fat. In recent times, Krause[10] made a detailed study of the lipids of normal bovine lenses from one-year-old animals, and found the sum of all the lipid fractions equal to 0.324 percent wet weight, or 0.965 percent dry weight. After the lenses had been dried and ground to powder, the lipids were extracted in Soxhlet with ether. The last traces of the lipids were removed by alkaline hydrolysis of the residue.

From this brief survey of the literature it is evident that there are certain inconsistencies between the results published by different investigators. This is undoubtedly due to the great diversity in methods of lipid extraction, and also to omission of the age factor as well as failure to differentiate between intra- and extracapsular lenses. According to Cahn, the total amount of lipids in cataractous lenses exceeds greatly that of normal lenses. This, however, is refuted by the results obtained by Goldschmidt; on the contrary, Goldschmidt found a much lower value (4.39 percent) for cataractous human lenses than for normal lenses (8.37 percent) of approximately the same age. And the total ether extractives of cataractous human lenses reported by Gross give even lower figures (2.55-3.20 percent) than those given by Goldschmidt. Similar inconsistencies are found, for the same reasons, between the results obtained by different investigators on animal lenses. It is to be pointed out that the method used by Krause is one of the most up-to-date methods in lipid extraction, and the results of his work must, therefore, at least for the present, be used as a criterion in passing judgment on the findings of earlier investigators in the study of the lipid content of animal lenses. This method, however, is not suitable for a small amount of material, such as that found in a single lens. In the present study an endeavor was made to determine the amount of total lipids in each lens separately. For this purpose a simple micromethod was devised, incorporating the newest suggestions with respect to lipid extraction from animal tissues. The method, in principle, was already employed in earlier studies of cholesterol[11] and phospholipids.[12, 13] In the course of the work, however, a few improvements were made; also certain steps were added as required by the adaptation of the method to the work on total lipids. The method is as follows: After the lens is weighed and spread on filter paper, it is placed in a 25-c.c. Erlenmeyer flask and covered with 1.5 c.c. of chloroform. If it should not be convenient to proceed further, the flask is stoppered and set aside in the dark until such time when extraction is convenient. The chloroform is a preservative and relatively inactive chemically. In the presence of chloroform the lens can be kept in the dark for many weeks without the slightest change occurring in any of the lipid fractions. In addition, chloroform does not harden nor coagulate the tissue, as many other fat

solvents do; hardening of the lens tissue at this stage would make it too resistant to a thorough pulverization in subsequent treatments. When the process of extraction is continued after the addition of chloroform, a small quantity, approximately 1 c.c., of an ether-alcohol mixture in the proportion of 1:4 is added and the lens mass, wrapped in filter paper, is gently kneaded and macerated with a blunt stirring rod until it becomes more or less pulverized. The supernatant extract is filtered through a small, dry filter paper (Whatman, No. 4, 5.5 cm.) into a thin-walled weighing bottle (specially made by a glass-blower), 15 c.c. in capacity and weighing approximately 6.5 grams. The residue is further extracted in the same manner with the ether-alcohol mixture, then twice with acetone, using each time 1.5 c.c. of the solvent. The filter paper is washed three times with 0.5-c.c. portions of acetone. The combined extracts are evaporated in a drying oven at 65°C. and the quantity of lipids is estimated gravimetrically with sensitive chemical balance.

In this study the total lipids of each of 128 cataractous human lenses were determined. All cataracts were extracted by the intracapsular method after they had been examined with a slitlamp microscope and classified as to stages of development; i.e., incipient, intumescent, and mature. In each case the approximate duration, as ascertained from the patient, was also noted. Preparatory to lipid extraction, when the lenses were spread on filter paper by means of a porcelain spatula, they were studied with respect to stages of sclerosis. Among the lenses were some that were practically normal with respect to sclerosis; in table 3 this group is designated by 0. The next group, showing slight sclerosis, is designated by +; the third group, with pronounced sclerosis, is designated by ++; and the fourth group, with advanced sclerosis, is designated by +++.*

TABLE 1

MINIMUM, MAXIMUM, AND AVERAGE TOTAL FAT VALUES OF CATARACTOUS LENSES IN DIFFERENT STAGES OF OPACIFICATION

| Stage | No. of Lenses | Age of Patient | Duration Years | Weight Gm. | Mg. of Total Lipids per Lens | Gm. of Total Lipids per 100 Gm. |
|---|---|---|---|---|---|---|
| Incipient | 79 | 41–85 | 0.30–10.00 | 0.1343–0.2897 | 1.2–5.2 | 0.815–2.328 |
| Averages | | 68.9 | 2.77 | 0.2009 | 3.3 | 1.621 |
| Intumescent | 12 | 44–84 | 0.67– 5.00 | 0.1825–0.3699 | 1.7–4.3 | 0.892–1.792 |
| Averages | | 69.1 | 2.56 | 0.2477 | 3.4 | 1.409 |
| Mature | 37 | 46–87 | 1.00–15.00 | 0.1407–0.2558 | 1.5–6.1 | 1.000–3.142 |
| Averages | | 70.6 | 4.17 | 0.1946 | 3.5 | 1.790 |

The experimental results of the present study show that cataracts and pathologic sclerosis are more or less related, thus corroborating, in a different way, the conclusions drawn in the article on the phospholipid content of the same lenses.[13] There is a slight increase in total lipids, in terms of absolute amounts, or milligrams per lens, as the cataractous condition advances from the incipient to the mature stage. The average amount of lipids per lens for 79 incipient cataracts is 3.3 mg., and that for 37 mature cataracts is 3.5 mg. (Table 1). We find exact-

* For a detailed description and discussion of lenticular sclerosis as well as a brief survey of literature on sclerosis in general, the reader is referred to the article on the phospholipid content of the same lenses.[13]

ly the same average figures in table 2 for the 26 "practically normal" lenses with respect to sclerosis and the 38 highly sclerosed lenses, respectively. A resemblance between the two groups of lenses is shown also when the lipid values are expressed in terms of percentage. The average percentage of the lipids increases from 1.621 for the incipient group to 1.790 for the mature group. Similarly the average percent of 1.732 for "practically non-sclerosed" lenses increased to 1.816 for highly sclerosed lenses. The intermediary, or intumescent, stage in table 1 shows a low value, only 1.409 percent; and the values for the two intermediary stages, i.e., slight sclerosis and pronounced sclerosis, in table 2 are also low, the respective averages being 1.500 percent and 1.575 percent. These lower percentages in both groups are due to the heavier average weights of the lenses in these groups. There is a distinct increase in the average weights of lenses in connection with the development of cataractous and sclerosed conditions up to the last stages. Then there is a sudden decrease in weight. This sudden fall in weight clearly indicates that the previous increase was chiefly due to water absorption. When the height of swelling is reached and the limiting membrane, the capsule, has become more permeable, the dissolved parts of the lens, a product of autolysis, begin to diffuse out into the surrounding aqueous and vitreous humors, and a rather sudden decrease in weight results.*

The lenses were classified also according to age in decades (table 3). The results show that the lipid content of crystalline lenses increases with age, both on the basis of absolute amounts, or milligrams per lens, and percent, or grams of lipids per 100 gm. of the lens material.

TABLE 2

MINIMUM, MAXIMUM, AND AVERAGE TOTAL LIPID VALUES OF CATARACTOUS LENSES IN DIFFERENT STAGES OF SCLEROSIS

| Stage* | No. of Lenses | Age of Patient | Duration Years | Weight Gm. | Mg. of Total Lipids per Lens | Gm. of Total Lipids per 100 Gm. |
|---|---|---|---|---|---|---|
| 0 | 26 | 48–81 | 0.33– 7.00 | 0.1426–0.2259 | 1.7–5.0 | 0.897–2.328 |
| Averages | | 61.4 | 2.35 | 0.1918 | 3.3 | 1.732 |
| + | 31 | 41–83 | 0.50– 5.00 | 0.1343–0.2963 | 1.2–5.2 | 0.815–2.201 |
| Averages | | 67.2 | 2.37 | 0.2160 | 3.2 | 1.500 |
| ++ | 33 | 57–84 | 0.42–10.00 | 0.1617–0.3699 | 2.0–5.1 | 0.892–2.630 |
| Averages | | 72.6 | 2.91 | 0.2172 | 3.4 | 1.575 |
| +++ | 38 | 46–87 | 1.00–15.00 | 0.1407–0.2638 | 1.5–6.1 | 1.000–3.142 |
| Averages | | 71.8 | 4.41 | 0.1959 | 3.5 | 1.816 |

* 0 indicates "practically normal" lenses; +, slight sclerosis; ++, pronounced sclerosis, and +++, highly advanced sclerosis.

Thus the lowest value, 2.2 mg. of total lipids per lens, is shown by a normal lens from an 18-year-old girl. The average value of 7 cataractous lenses in the fifth decade is 2.5 mg., and the range of variation is between 1.7 and 3.7 mg. per lens. In the sixth decade the average from 17 lenses is 2.9 mg. per lens, and the limits of variation are 1.2 and 4.5 mg. For the seventh decade the average from 39 lenses is 3.3 mg., for the eighth decade from 45 lenses the average is 3.6 mg., and for the ninth decade from 19 lenses the average is 3.8 mg.; the respective ranges of variations for the seventh, eighth, and ninth

* For a more detailed discussion on this point the reader is referred to the article on the phospholipid content of the same lenses.[13]

decades are: 1.8-5.3, 2.2-6.1, and 2.6-4.7. In terms of percentage the values are as follows: Second decade, 1.290; fifth decade, 1.545, range 0.815-2.080; sixth decade, 1.485, range 0.894-2.279; seventh decade, 1.668, range 0.942-2.928; eighth decade, 1.697, range 0.892-2.630; ninth decade, 1.710, range 1.013-2.040.

When the present data on total lipids of cataractous human lenses are compared with those on phospholipids[12, 13] is due chiefly to the increase in the weights of the lenses through absorption of water. But in the mature stage, in which the absorbed water is being lost again by diffusion, there is also a proportional increase in cholesterol, showing that this lipid fraction remains more or less unaffected as to its absolute amount. The phospholipids, on the other hand, undergo a further decrease. Since the average weight of the lenses of mature cataracts is less than that of intumescent

TABLE 3

MINIMUM, MAXIMUM, AND AVERAGE TOTAL FAT VALUES OF CATARACTOUS LENSES ACCORDING TO AGE IN DECADES

| Age Decade | No. of Lenses | Age of Patient | Duration Years | Weight Gm. | Mg. of Total Lipids per Lens | Gm. of Total Lipids per 100 Gm. |
|---|---|---|---|---|---|---|
| II | 1 | 18 | Normal lens | 0.1705 | 2.2 | 1.290 |
| V | 7 | 41–46 | 1.00–10.00 | 0.1426–0.2085 | 1.7–3.7 | 0.815–2.080 |
| Averages | | 43.7 | 3.45 | 0.1709 | 2.5 | 1.545 |
| VI | 17 | 50–59 | 1.00– 7.00 | 0.1343–0.2563 | 1.2–4.5 | 0.894–2.279 |
| Averages | | 55.6 | 2.65 | 0.1970 | 2.9 | 1.485 |
| VII | 39 | 60–69 | 0.50–15.00 | 0.1407–0.2558 | 1.8–5.3 | 0.942–2.928 |
| Averages | | 66.1 | 3.39 | 0.1975 | 3.3 | 1.668 |
| VIII | 45 | 70–79 | 0.33–8.00 | 0.1517–0.3699 | 2.2–6.1 | 0.892–2.630 |
| Averages | | 74.5 | 3.10 | 0.2122 | 3.6 | 1.697 |
| IX | 19 | 80–87 | 0.50–10.00 | 0.1760–0.2963 | 2.6–4.7 | 1.013–2.045 |
| Averages | | 82.0 | 5.35 | 0.2194 | 3.8 | 1.710 |

and cholesterol[11] we find that on the average the phospholipids constitute 30.3 percent, and cholesterol 33.0 percent of the total lipids of lenses with incipient cataracts, the rest, or 36.4 percent, being unclassified lipids, or fat. For the intumescent group the values are: 28.4 percent phospholipids, 28.9 percent cholesterol, and 42.7 percent fat. For the mature cataracts they are: 25.7 percent phospholipids, 30.1 percent cholesterol, and 44.2 percent fat.

From the foregoing data it is apparent that there is a slight decrease in percentage of both cholesterol and phospholipids of the intumescent group as compared with the incipient group. This decrease cataracts, this decrease in phospholipids must be considered as an actual loss, either through disintegration and diffusion into the surrounding aqueous and vitreous humors, or through their transformation into ordinary fat. The latter process is strongly suggested, at least in part, by the fact that there is a steady and pronounced increase in fats throughout the entire course of cataract development.

Since some of the investigators who have determined the lipid content of crystalline lenses have expressed the results in terms of wet weight and others in terms of dry weight, it was thought necessary for the sake of better orientation to give the values in both terms and calculate the

supplementing values from the given data. In the calculation it was assumed, on the basis of earlier publications, that calf and infant lenses consist of approximately 31.4 percent solids, and all other lenses contain approximately 35.0 percent solids. Tables 4 and 5 give the data for animal and human lenses, respectively.

TABLE 4

GENERAL SUMMARY OF RESULTS ON TOTAL LIPIDS OF NORMAL ANIMAL LENSES

| Authors | Source of Material | Percentage of Lipids | | Age | Remarks |
|---|---|---|---|---|---|
| | | Wet Weight | Dry Weight | | |
| Berzelius, 1840 | Oxen | 2.40 | 6.864* | ? | Extracted with alcohol |
| Simon, 1840 | Oxen<br>Horses | 0.045<br>0.142 | 0.129*<br>0.406* | ? | Extracted with salt solutions |
| Kühne, 1868 | Oxen | 2.00 | 5.75* | ? | Evidently extracted with alcohol |
| Laptschinsky, 1876 | Oxen<br>Range | 0.74<br>0.41–1.20 | 2.116*<br>1.17–3.43* | ?<br>? | Extracted with alcohol |
| Hoppe-Seyler, 1885 | Oxen and sheep | 0.182* | 0.52 | ? | Extracted with alcohol |
| Gross, 1907 | Calves<br>Range<br>Cows<br>Range | 0.63<br>0.47–0.99<br>0.59<br>0.47–0.76 | 1.98*<br>1.48–3.11*<br>1.69*<br>1.34–2.17* | ?<br><br>Above 13 years | Dried at 110° C. Extracted with ether |
| Krause, 1935 | Oxen | 0.324 | 0.965 | 1 year | Dry lens powder extracted with ether in Soxhlet |

* Supplementary figures calculated from the original values.

## SUMMARY

A brief review of the results obtained by earlier investigators on the lipid contents of different types of crystalline lenses is presented. Several inconsistencies in their findings are pointed out. These inconsistencies are attributed chiefly to defective methods of lipid extraction, and, to a lesser degree, to omission of age as well as failure to differentiate between intra- and extracapsular lenses.

In the present study a simple micromethod was devised, by which estimation of the total lipid content in a single lens was made possible. By this method estimates are made of the lipids gravimetrically after their extraction with various fat solvents, such as chloroform-alcohol mixture, ether-alcohol mixture, and acetone.

A total of 128 human cataractous lenses was analyzed for total lipid content. All cataracts were removed by the intracapsular method, after they had been examined with the slitlamp microscope and classified according to stages of development, i.e., incipient, intumescent, and mature. Preparatory to lipid extraction, when the lenses were spread on filter paper by means of a porcelain spatula, they were examined with respect to stages of sclerosis.

The experimental results show that cataract and pathologic sclerosis are more or less related. The total lipids of both mature cataracts and highly sclerosed lenses are slightly higher than those of practically normal lenses, both on the basis of percentage and absolute amounts. Both cataractous and sclerosed lenses increase in weight up to the last stages,

whereupon there is a marked and abrupt fall in weight. This indicates that the increase in weight in the lenses of both types is chiefly due to water absorption, and that the sudden fall in weight is produced by diffusion of the dissolved lens substance into the aqueous and vitreous humors at the height of intumescence.

lipids, cholesterol, and unclassified lipids, or fat, in approximately equal amounts, but the ratio between the phospholipids and the fat decreases with the development of the cataract; i.e., the phospholipids decrease and the fat increases as the cataracts approach maturity. To a lesser degree this is true also of the cho-

TABLE 5

GENERAL SUMMARY OF RESULTS ON TOTAL LIPIDS OF NORMAL AND CATARACTOUS HUMAN LENSES

| Authors | Type of Lens | Percentage of Lipids | | Age Years | Remarks |
|---|---|---|---|---|---|
| | | Wet Weight | Dry Weight | | |
| Cahn, 1881 | Normal | 0.713* | 2.04 | ? | Evidently extracted with alcohol |
| | Cataractous (a) | 3.755* | 10.74 | ? | |
| | Cataractous (b) | 2.290* | 6.54 | ? | |
| Gross, 1907 | Cataractous (a) | 0.900* | 2.55 | ? | Extracapsular. Dried at 110°C. and extracted with ether. |
| | Cataractous (b) | 1.120* | 3.20 | ? | |
| Goldschmidt, 1922 | Post mortem (1) | 0.675* | 2.12 | 0–1 | Intracapsular. Dried at 37°C. to constant weight. Extracted with alcohol, petroleum-ether, acetone, and benzol. |
| | Post mortem (2) | 2.147* | 6.14 | 1–10 | |
| | Post mortem (3) | 2.920* | 8.35 | 70–75 | |
| | Cataractous | 1.540* | 4.39 | ? | |
| Salit, 1931 | Cataractous | 2.80 | 8.00* | ? | Extra- and intracapsular. Extracted with ether-alcohol and estimated nephelometrically as saponifiable fat. |
| | Range | 1.53–4.00 | 4.38–11.44* | | |
| Salit, 1936 | Cataractous | | | | Intracapsular. Extracted with chloroform-alcohol, ether-alcohol, and acetone. Estimated gravimetrically. |
| | Incipient | 1.621 | 4.64* | 68.9 | |
| | Range | 0.82–2.33 | 2.35–6.66* | 41–85 | |
| | Intumescent | 1.409 | 4.03* | 69.1 | |
| | Range | 0.89–1.79 | 2.55–5.12* | 44–84 | |
| | Mature | 1.790 | 5.12* | 70.6 | |
| | Range | 1.00–3.14 | 2.86–8.98* | 46–87 | |

* Supplementary figures calculated from the original values.

The lenses were classified also according to age in decades, and it was found that the total lipids increase perceptibly with age, both on the basis of percentage and absolute amount.

The total lipids of senile human cataractous lenses are made up of phospho-

lesterol—fat ratio, but here the cholesterol remains practically the same, and the diminution in ratio is chiefly due to increase in fat.

Dr. C. S. O'Brien, Head of the Department of Ophthalmology, gave valuable help throughout this work.

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# MODIFICATION OF THE DESMARRES OPERATION FOR TRANSPLANTATION OF THE PTERYGIUM

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The various surgical procedures for dealing with pterygium are critically discussed. The author describes his own method which has the advantage of requiring the least possible loss of conjunctival covering and the utilization of the growth in its transplantation so that the new position facilitates the covering of the denuded area to bring about healing by first intention. Read before the Colorado Congress at Denver, July 25, 1936.

Before proceeding to a review of the surgical methods, certain facts bearing on removal of a pterygium should be borne in mind; namely,

(1) All of the growth must be removed from the cornea and all that lies in the conjunctiva must be placed so that its tissue fibers no longer are directed toward the cornea, or it will return. (2) There should be the least possible loss of conjunctival covering. (3) The denuded area over the sclera caused by its removal should be fully covered by smooth normal conjunctiva and the conjunctival flaps should be drawn over the area using the least possible tension. (4) The disposition of the growth, bearing in mind these three preceding points, is to be considered.

Surgery for the removal of the pterygium falls under three general classes: excision, subinvolution, and transplantation.

Excision or ablation was tried and given up years ago, because there was such a tendency to recurrence and because of scar-tissue formation which limited ocular movement. Arlt's[1] operation is typical of this class. However, he was the first to teach the necessity of covering the denuded area with conjunctiva.

Subinvolution, the operation of Bettman and Galezowski,[2] consists in carrying the tip of the pterygium back under the base of the growth and the ligation of the whole. This is but a modification of excision. Since this operation has

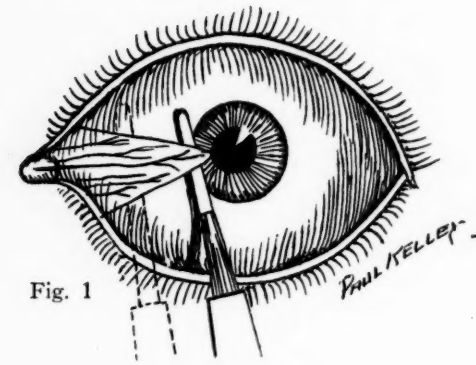

Fig. 1

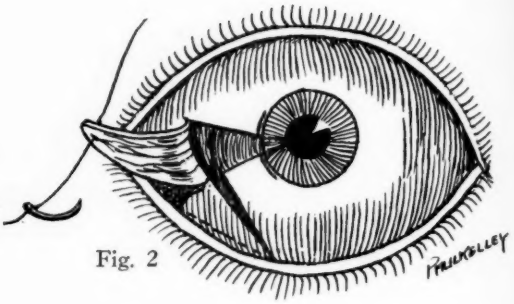

Fig. 2

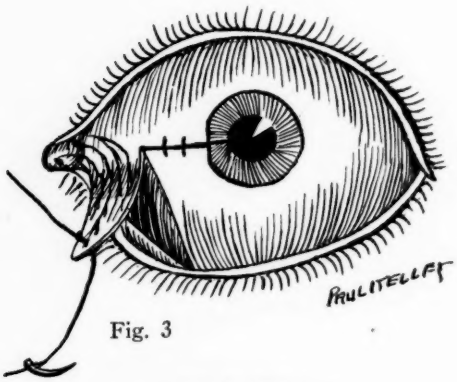

Fig. 3

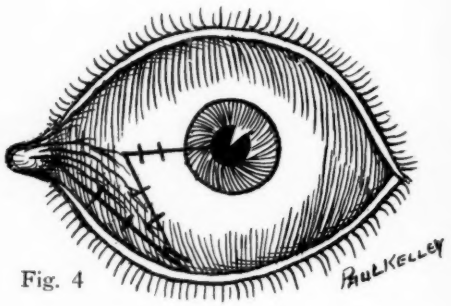

Fig. 4

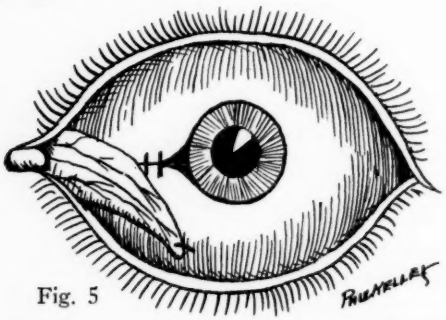

Fig. 5

Fig. 1 (Miller). Free the pterygium from the tip back to about midway between the corneal margin and canthus. Leave the tip attached until the last of the dissection. When it has been dissected, transfix with a suture, passing the needle from the conjunctival surface back.

Fig. 2 (Miller). Elevate the conjunctiva above and below. Place 00 silk sutures to draw conjunctiva over denuded scleral area. Cut conjunctiva obliquely downward and outward to the inferior fornix. With curved scissors cut conjunctiva at scleral margin sufficiently to cover this area.

Fig. 3 (Miller). Tie sutures, closing conjunctiva over the former position of the pterygium. This done, a triangular denuded area has been prepared leading downward from the lower border of the pterygium.

Fig. 4 (Miller). The pterygium is brought downward and adjusted into the triangle just formed. The needle with which the tip of the pterygium was transfixed is brought through the extreme tip of the angle formed and the suture tied. One or two supporting sutures are placed on each side of the growth, care being taken to cover the area neatly. The cornea is carefully freed of any particles of remaining growth and all edges of the conjunctival flaps are smoothed into place. The eye is covered with firm gauze compresses.

Fig. 5 (Miller). The Desmarres operation.

never appealed to me, I have never employed it. I doubt if now excision or ablation is employed.

Then came along methods of transplantation of the growth: the operation of Desmarres,[3] that of Knapp,[4] and of McReynolds.[5]

These operations will be discussed briefly, attention being called to several disadvantages in the technique of each

and the features of the operation to be presented which appear to be of definite advantage.

### The McReynolds Operation

For several decades the McReynolds operation has been the operation of choice. It has, without a doubt, given satisfactory results or it would not have continued so long in favor. However, years ago I found reason to criticize this technique. In order to point out my objections it is necessary to describe the operation briefly, as follows:

The growth is removed from the cornea and from the adjacent conjunctiva on the lower border of the pterygium only, to about the middle point between the limbus of the cornea and the canthus, elevating the conjunctiva downward and slightly outward to the inferior fornix. The pterygium is also elevated in its entire length and the conjunctiva above it. With a small curved needle in each end of a silk suture, the tip of the growth is transfixed by one of the needles. Having passed both needles to the bottom of the cul-de-sac and out into the conjunctival sac near the fornix, with tooth forceps the conjunctiva is drawn upward toward the base of the pterygium. The tip is then drawn well downward toward and well into the fornix under the conjunctiva and sutured there. This carries the growth down well beneath the bulbar conjunctiva.

I have three points of criticism of this operation:

(1) It is contrary to all principles of surgery to bury skin or its modification (the conjunctiva) beneath or under other tissue.

(2) There is a prolonged period of recovery, since nature makes an effort to discharge this foreign body; consequently there is a long period of hyperemia, redness, and discharge of mucus.

(3) The advocates of this operation claim that the growth is eventually absorbed. Even should this be its disposition, absorption of such foreign tissue can take place only in association with prolonged hyperemic reaction.

Some years ago I undertook to determine what actually became of the pterygium when so buried. In doing this a black suture was tied to the tip before the latter was drawn under the conjunctiva and into the prepared pocket; then it was carried down and the suture tied in the usual way. In about a week the suture knot on the conjunctival surface was cut off, leaving a portion attached to the tip under the conjunctiva near the inferior fornix. Some time later it was possible to remove this remaining portion of the suture on the conjunctival surface. The tip had retracted or had been forced out of the pocket by the tissue's natural efforts to throw out a foreign body. So in one instance at least, the buried conjunctiva was not absorbed.

It is not denied that good results may not be obtained by the McReynolds operation, but I do contend that it is not an operation from which one may expect quick recovery, or healing by first intention. The good results in this operation are due to the employment of proper technique in covering the original site of the pterygium. This area is healed over with healthy conjunctiva before the pterygium can escape from its tether; it has no chance to return to its former position.

My purpose in presenting this paper is to describe a surgical technique that I have followed for many years. In this operation the growth is utilized as a conjunctival covering; thus the loss of surface covering is avoided, such as results from excision, subinvolution, or the McReynolds operation.

My technique is as follows: (1) The first step in this operation is similar to the McReynolds operation, save that the pterygium is elevated to about one half the distance between the cornea and canthus from the sclera and conjunctiva above as well as below. The tip is left adherent until the last part of the dissection. When this is finally elevated it is transfixed with a suture from the conjunctival surface backward. This is done for convenience in suturing the tip in its new position.

(2) The conjunctiva is thoroughly elevated both upward and downward from the area of the pterygium, and is lifted well away from the superficial scleral fascia.

(3) From the point along the inferior border of the pterygium where the conjunctiva and pterygium remain attached, an incision is made downward and slightly outward. This incision should be carried to the inferior fornix.

(4) Two sutures are placed in the conjunctiva to close the denuded area formerly occupied by the growth. Now, properly holding the conjunctiva with thumb forceps, the conjunctiva is cut with iris scissors, upward and downward as close as possible to the limbus of the cornea. Then the sutures are tied. It will be noticed that the conjunctiva is drawn across and overlaps the corneal margin, a very beneficial factor in reducing the possibility of return of the growth. A second advantage is gained by so closing this wound; namely, the incision made downward and outward now becomes a triangle with the apex in the fornix.

(5) The fifth step is the transplantation of the growth into this triangle with the tip sutured down to the apex of the angle. It is very important to place one or two sutures on either side of the growth in such a manner that each will act as additional support in holding the conjunctival flap as well as the pterygium in the desired position. Care should be used that no conjunctival surface is turned under and that there remain no shreds nor tissue of former growth on the cornea. The eyelids are closed, a bit of 1:5000 bichloride ointment is spread on the lid, and the eye covered with a gauze pad. It should not be disturbed for several days. Union is usually by first intention. There is no long process of recovery.

If this technique in the operation is followed, healing occurs by first intention. The tissues quickly return to their normal appearance; that is, there is no prolonged hyperemia. No tendency to recurrence of the growth has been observed. It must be clearly understood that the pterygium atrophies but slowly under any circumstances.

Recently I saw an eye upon which I had operated some 10 years ago. One could still see the outline of the growth in the position where it had been placed, but it was no more hyperemic than the surrounding conjunctiva.

### Desmarres Operation

My attention but recently has been called to an operation published many years ago by Desmarres,[3] and I learned also that some other authors have described his operation; hence the procedure which I follow should properly be called a modification of the Desmarres operation.

In studying the technique of the Desmarres operation I find several very important details in which it differs from the one I perform, and these may point to the explanation of the failure of his operation to prove successful and therefore to become popular.

(1) There is no evidence of his having carefully elevated and freed the surrounding conjunctiva to be used in cover-

ing the denuded area. The conjunctiva was drawn together with too great tension, and stitches may not have held it together until union was secured.

(2) He did not separate the conjunctiva along the corneal margin and there remained an area, a very important one, uncovered, left to heal by scar tissue and encourage the return of the growth.

(3) He did not properly suture the growth in the new position, using but the one suture at the tip to hold it in place.

### The Knapp Operation

The Knapp operation[4] consists in splitting the pterygium, planting one half of it upward and the other half downward —somewhat similar to the technique I have employed. My objections to the Knapp operation are: The pterygium as we usually find it is a structure small enough to work with. Why then reduce its size and increase the labor by making two transplantations? But there is another vital criticism. Small, narrow strips are extremely hard to secure, especially under the upper lids, and because these have so large an area of movement the chances for growth of the graft are not improved. The lower lid, on the other hand, being nearly stationary, makes a good assistant in holding the transplant in the desired position. I can see no reason for the extra trouble required in following the technique of the Knapp operation in transplanting a part of the growth upward.

### Summary

As stated above, the method I employe is really an improved technique of the Desmarres operation; however, I had employed this operation many years before becoming aware of the Desmarres operation and its publication. The operation fully covers the points as set out in the beginning of this paper. The growth is fully removed and placed in a position least furthering its reformation, and so utilized that the wound is closed without loss of any of the conjunctival covering. This procedure favors rapid healing and reduces the possibility of recurrence to a minimum. The method employed conforms to modern principles of surgery.

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# NEO-SYNEPHRINE

## Mydriatic and tension-reducing actions

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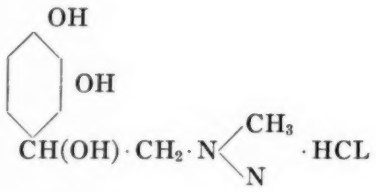
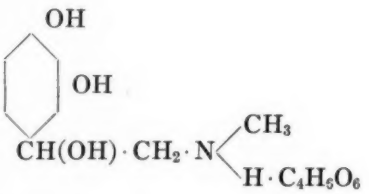
The effect of 0.25 percent neo-synephrine on 50 nonglaucomatous eyes is charted for rapidity and amplitude of mydriasis, also for changes in intraocular pressure. The results show that this drug is a rapid and apparently safe mydriatic. A preliminary study also indicates that neo-synephrine is efficient in reducing the tension in glaucoma. The stability and apparently low toxicity are emphasized. Read before the Kansas City Society of Ophthalmology and Otolaryngology, December 17, 1935.

In presenting these observations on the ophthalmic possibilities of neo-synephrine for comparison with the other epinephrines, no effort has been made to quote every writer on the subject of epinephrine in ophthalmic practice. Much has been written on this subject and a number of reviews presented, the latest being the excellent survey of Horner and Bettman, 1936.[1]

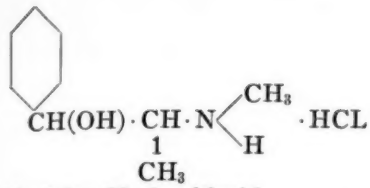
In the epinephrine group we have two natural products, ephedrine and epinephrine. Closely related to epinephrine we have a number of synthetic preparations almost identical in chemical structure including synthetic epinephrine itself. All of these have similar physiologic action, though it seems that there may be some slight variations. Most of them are not stable in solution. When dealing with a nonstable solution there is always doubt as to the rate of deterioration under the varying physical factors to which it is subjected in an office. Neo-synephrine hydrochloride is a stable preparation being resistant to heat to the extent of boilability and apparently not deteriorating over a reasonable time. In this study, the solution in one bottle which had been opened occasionally over a period of a year did not show any appreciable variation in its activity from fresh solutions received from the manufacturer. So far neo-synephrine has produced no local irritation, nor have I seen any systemic reaction. It is not a new product, having been accepted by the Council on Pharmacy two years ago,[2] but has been used mostly by rhinologists and internists and to my knowledge nothing has been published on its use in ophthalmology as a substitute for the better-known members of the epinephrine group, such as epinephrine bitartrate 1:50, adrenalin hydrochloride 1:100, 1:50, and others. Chemically, neo-synephrine is "The hydrochloride of the laevo isomer of a synthetically prepared derivative of phenylethylamine."[2] The manufacturers describe it as levo-meta-methylanimoethanolphenol hydrochloride and give the comparative structural formula of neo-synephrine and others of this group as:[3]



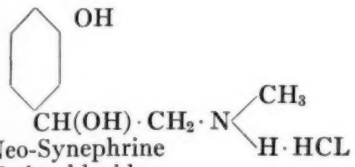

Epinephrine
Hydrochloride




Suprarenin
Bitartrate



Ephedrine Hydrochloride



Neo-Synephrine Hydrochloride

That epinephrine produces a mydriasis when injected subconjunctivally was recognized by Wesley (1900[4]) and studied by subsequent workers. L. T. Post (1934[5]) sums up the activity as due to stimulation of both the sphincter muscles and the sympathetic-nerve endings. That the intraocular pressure is affected by intravenous administration of epinephrine was noted by Parsons (1903[6]), Henderson and Starling (1904[7]), Wesley (1909, 1915[8]), Duke-Elder (1931[9]), and many others. Duke-Elder states that the effect is variable according to whether the local vasoconstriction and consequent lowering of intraocular blood pressure was dominant or whether the systemic vasoconstriction was dominant with the resultant rise of main-stem blood pressure, thus causing a rise in the intraocular-vessel pressure greater than the local constriction could overcome.

That the subconjunctival injection could cause a fall of intraocular pressure due to vasoconstriction was discussed by Rubert (1909[10]), Hamburger (1924[11]), Thiel (1925[12]), Duke-Elder (1931[9]), and a great many others. It was about 1924 that the study of the associated members of the epinephrine group became wider spread. Hamburger at this time brought forward glaucosan, a synthetic dextrorotatory epinephrine. Gradle (1925[13]) suggested 1:100 epinephrine hydrochloride on cotton in the conjunctival sac for use in lowering the pressure in glaucoma. In 1931, Green[14] suggested 1:50 solution of epinephrine hydrochloride dropped in the conjunctival sac or of the epinephrine bitartrate previously suggested in other strengths by Thiel and others. Green also called attention to the excellent mydriasis secured by subconjunctival injection of 1:1000 epinephrine hydrochloride.

Physiologically the epinephrine group has two activities: mydriasis and reduction of pressure. The mode of action in producing mydriasis as stated above (L. T. Post[5]) is: a stimulation of the sympathetic-nerve endings in the iris by increasing the sympathetic-end-organ irritability and the direct stimulation of the dilator-muscle fibers. Amsler (1920[15]) drew attention to an inverse action of the epinephrine in increasing the irritability of the parasympathetic end organs when the sympathetic was disabled. From this it may be reasonably expected that the irritability of both the sympathetic and parasympathetic end organs is increased but that the sympathetic dominates. This may partially explain why eserine has seemed to retain its miotic power better when used with neo-synephrine than when used with pilocarpine, as eserine and epinephrine should reinforce each other in their action on the parasympathetic endings.

At this point let us review the action of eserine on the intraocular musculature, circulation, and tension as given by Duke-Elder.[16] He states that in the normal eye intraocular pressure rises from increasing vascular permeability but that the rise is counterbalanced by contraction of the ciliary muscle. "This by actual compression constricts the anterior ciliary arteries and opens the choroidal veins and the trabeculae of the angle of the anterior chamber by traction. When the drainage

EFFECT OF NEO-SYNEPHRINE ON NONGLAUCOMATOUS EYES

| No. | Age yrs. | Eye | Tension Schiötz mm.Hg | Pupil mm. | Neo Syn. % | 15 min. Tension mm. Hg | 15 min. Pupil mm. | 30 min. Tension mm. Hg | 30 min. Pupil mm. | 45 min. Tension mm. Hg | 45 min. Pupil mm. | Diagnosis | Time for Eserine to overcome | Tension mm. Hg | Pupil mm. | Iris |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 71 | O.D.<br>O.S. | 23<br>23 | 4<br>4 | 1 | | | 14<br>14 | 9<br>9 | 14<br>14 | 9<br>9 | Cataract | 1%<br>30 min. | 14<br>14 | 3<br>3 | Blue |
| 2 | | O.D.<br>O.S. | 17<br>18 | 3½<br>3½ | ¼ | | x<br>x | 12<br>16 | 6<br>4 | | | 1. Hyperpresbyopia<br>2. Vitreous opacity | 2 hrs.<br>1% Pilo. | | 4<br>4 | Blue |
| 3 | 54 | O.D.<br>O.S. | 19<br>20 | 3½<br>3½ | ¼ | | x<br>x | 27<br>23 | 7<br>7½ | | | Retinitis, arterio-sclerotic | 1%<br>15 min. | | 4<br>4 | Brown |
| 4 | 25 | O.D.<br>O.S. | 27<br>27 | 3¼<br>3¼ | ¼ | | x<br>x | 15<br>15 | 5<br>5 | 15<br>15 | 6<br>5 | Retinitis of blood dyscrasia | ¼%<br>Dismissed | | | Brown |
| 5 | 69 | O.D.<br>O.S. | 15<br>10 | 3<br>3 | ¼ | 15<br>15 | 3<br>3 | 15<br>13 | 3<br>4½ | 20<br>20 | 5<br>6 | 1. Cataract secondary<br>2. Corneal scars—Trachoma arrested | 1%<br>15 min. | | 5<br>5 | Brown |
| 6 | 64 | O.D.<br>O.S. | 31<br>31 | 3½<br>3½ | ¼ | 36<br>31 | 4<br>3½ | 23½<br>23½ | 6<br>4 | 20<br>18 | 8<br>5 | Cataracts | 1%<br>15 min. | 28<br>28 | 2<br>1½ | Blue |
| 7 | 36 | O.D.<br>O.S. | 22<br>22 | 3<br>3 | ¼ | 20<br>23 | 4<br>4 | 18<br>22 | 5<br>7 | | 1<br>1½ | Corneal Scars—traumatic and industrial | 1% | 18<br>20 | 1<br>1½ | Gray |
| 8 | 31 | O.D.<br>O.S. | 21<br>21 | 2½ | ¼ | 22 | Not | 26<br>Dilated | 3¼ | 20 | 8 | Cataract<br>Aphakia postoperative | | | | Gray |
| 9 | 60 | O.D.<br>O.S. | 20<br>23 | 3½<br>3½ | ¼ | 19<br>18 | 5<br>5½ | 20<br>19 | 7<br>8 | 18<br>20 | 7½<br>8 | Refractive error | ¼%<br>20 min. | 23<br>22 | 1½<br>2½ | Gray |
| 10 | 51 | O.D.<br>O.S. | 20<br>20 | 4<br>4 | ¼ | 18<br>18 | 6<br>5 | | | 17<br>18 | 7<br>6½ | 1. Brain tumor<br>2. Choked disc | 2 gtt. 1%<br>35 min. | 17<br>17 | 3<br>3½ | Blue-gray |
| 11 | 11 | O.D.<br>O.S. | 20<br>21 | 5<br>5 | ¼ | 18<br>23 | 5½<br>5 | 16<br>17 | 8<br>7 | 17<br>20 | | Myopia | ¼%<br>35 min. | 18<br>16 | 4<br>5 | Blue |
| 12 | 12 | O.D.<br>O.S. | 20<br>20 | 4<br>4 | ¼ | 18<br>18 | 4<br>4 | 23<br>23 | 6<br>5 | 20<br>20 | | Myopia | ¼%<br>35 min. | 23<br>20 | 2½<br>2½ | Brown |
| 13 | 69 | O.D.<br>O.S. | 22<br>22 | 2¾<br>2½ | ¼ | 23<br>22 | 6½<br>6 | 20<br>18 | 6½<br>6½ | | | Cataract incipient | 2 gtt. ¼%, and 1 gtt. 1%<br>15 min. | 23<br>23 | | Gray |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 69 | O.S. | 22 | 2½ | ¼ | 22 | | 6 | 18 | | 6½ | | | | | and 1 gtt. 1% 15 min. | 23 | Gray |

EFFECT OF NEO-SYNEPHRINE ON NONGLAUCOMATOUS EYES

| No. | Age yrs. | Eye | Tension Schiötz mm. Hg | Pupil mm. | Neo Syn. % | 15 min. Tension mm. Hg | | 15 min. Pupil mm. | 30 min. Tension mm. Hg | | 30 min. Pupil mm. | 45 min. Tension mm. Hg | | 45 min. Pupil mm. | Diagnosis | Time for Eserine to overcome | Tension mm. Hg | Pupil mm. | Iris |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 63 | O.D.<br>O.S. | 23<br>23 | 3½<br>4 | ¼ | 23<br>23 | | 6<br>4 | | | | 18<br>22 | | 9<br>9 | 1. Cataract<br>2. Retinal hemorrhage | 1 gtt. ¼%<br>3 gtt. 1%<br>3 hrs. | 15<br>17 | 4½<br>4 | Blue |
| 15 | 48 | O.D.<br>O.S. | 21<br>27 | 4½<br>4½ | ¼ | 17<br>20 | x | 8<br>4½ | 18<br>18 | | 9<br>5 | | | | Cataract | ¼%<br>15 min. | 18<br>18 | 6<br>1½ | Blue |
| 16 | 55 | O.D.<br>O.S. | 18<br>18 | 2½<br>2¾ | ¼ | 18<br>15 | | 3¼<br>3¼ | 23<br>23 | | 6<br>6½ | | | | Cataract incipient | 3 gtt. 1%<br>45 min. | 18<br>18 | 4½<br>5 | Brown |
| 17 | 28 | O.D.<br>O.S. | 13<br>15 | 2½<br>2½ | ¼ | 13<br>15 | | 3½<br>4 | 9<br>17 | | 3½<br>5½ | 12<br>17 | | 3½<br>7 | Iritis (O.D.) | 15 min. | 12<br>17 | 5 | Brown |
| 18 | 66 | O.D.<br>O.S. | 25<br>26 | 3½<br>3½ | ¼ | | | | 26<br>25 | | 5<br>6 | | | | Cataract | 1%<br>40 min. | 22<br>25 | 1½<br>2 | Blue |
| 19 | 73 | O.D.<br>O.S. | 31<br>30 | 2½<br>2½ | ⅛ | 32<br>32 | | 5<br>5 | 32<br>32 | | 2<br>2 | (2 gtt. 1% eserine) | | | Optic neuritis | 15 min. | 30<br>30 | 3<br>3 | Blue |
| 20 | 41 | O.D.<br>O.S. | 17<br>17 | 4¼<br>3½ | ¼ | 18<br>15 | | 5½<br>4 | 18<br>15 | | 7½<br>6 | | | | Chorioretinitis | 1% | 18<br>15 | 4½<br>3½ | Gray |
| 21 | 32 | O.D.<br>O.S. | 23<br>18 | 3½<br>3½ | ¼ | 23<br>23 | | 4½<br>5 | 16<br>18 | | 5<br>5 | 16<br>16 | | 6<br>5½ | Optic neuritis—Systemic retinitis | Not used | | | Blue-gray |
| 22 | 56 | O.D.<br>O.S. | 25<br>25 | 3<br>3 | ¼ | 18<br>18 | | 4<br>4 | 20<br>23 | | 4<br>4 | 20<br>23 | | 5½<br>5 | 1. Retinitis capillary Sclerotic.<br>2. Retinal hemorrhage | ½%<br>30 min. | 18<br>25 | 1½<br>1½ | Blue |
| 23 | 68 | O.D.<br>O.S. | 27<br>25 | 3<br>3 | ¼ | 26<br>23 | | 5<br>5 | | | | | | | Cataract incipient | ½%<br>20 min. | 17<br>20 | 3<br>3½ | Brown |
| 24 | 73 | O.D.<br>O.S. | 23<br>25 | 4<br>5 | ¼ | 25<br>30 | | 4½<br>4 | 21<br>23 | | 7<br>7 | | | | Cataract incipient | 1%<br>20 min. | 18<br>18 | 4<br>3 | Hazel-brown |
| 25 | 55 | O.D.<br>O.S. | 23<br>19 | 2½<br>2½ | ¼ | 20<br>19 | | 4<br>4 | 18<br>15 | | 7<br>6½ | 15<br>15 | | 7<br>7 | 1. Cataract incipient<br>2. Choroiditis | 1%<br>15 min. | 15<br>15 | 3<br>3½ | Brown |

canals are constricted in glaucoma, these factors assume a primary importance and a fall in intraocular pressure may follow." The pressure reduction of epinephrine is due to vasoconstriction as explained by Duke-Elder:[17] "The result is a primary rise in pressure followed by a fall due to vasoconstriction." In other words there is a restricted inflow and unrestricted outflow. Wesley[18] also thinks there is an inhibition of aqueous secretion.

In consideration of these factors the use of eserine and epinephrine combined in glaucoma should be so balanced that there would be vasoconstriction from epinephrine, opening of the drainage channels from eserine, and sufficient inhibition of an epinephrine mydriasis to prevent the jamming of the angle of the anterior chamber by the root of the iris, if the reduction in tension is purely a drainage problem. Further, there should be no systemic pressor effect sufficient to raise the general blood pressure appreciably. Gradle,[20] Hamburger (quoted by Gradle[20]) and L. T. Post[5] believe secondary changes to be responsible for the prolonged lowering of tension. Wessely (quoted by Horner and Bettman[1]) thinks the secretion of aqueous is inhibited. Gautiere (1922[19]) states that eserine will not overcome epinephrine mydriasis but that epinephrine will overcome eserine. However, Horner and Bettman[1] in their recent excellent article on suprarenin bitartrate as a mydriatic had no difficulty in overcoming mydriasis with eserine. Nor did Gradle (1928[20]) have trouble in overcoming epinephrine hydrochloride.

In this study neo-synephrine has been found to have satisfactory mydriatic power and also satisfactory pressure-reducing power. While the primary purpose herein is to report upon the use of neo-synephrine as a mydriatic in a series of nonglaucomatous eyes of all ages and to report the pressure effect on these eyes during the period of dilation and following the elimination of mydriasis by eserine, several cases of glaucoma are included to show that we are dealing with a preparation capable of satisfactorily reducing pressure. In fact, the study on the normal eye was undertaken, first, to evaluate the safety as a transient mydriatic and, second, to obtain a better understanding from a study of the normal eye the activity of neo-synephrine and eserine, in order that the glaucomatous eye might be more satisfactorily treated.

In the mydriasis and pressure study the technique was identical in each case. The pupil was measured under the same light intensity and angle of incidence to the cornea, the same weight on the tonometer was used, and the same strength and dosage of neo-synephrine. The 45-minute reading was not taken in all cases, as excessively quick mydriasis was considered dangerous and was checked with eserine. The strength of eserine used for miosis varied from 0.25 to 1 percent. In only one case did the miosis fail to occur quickly. In this case, though three hours were required and two drops of 0.25 and three drops of 1-percent eserine were used, the intraocular pressure did not rise. In fact, the pressure was lower progressively. Only one patient complained of headache or discomfort other than slight pulling in the eye following 1-percent eserine.

The results may be summarized as follows (see table):

*Tension.* Out of 50 eyes, only 11 showed elevation of pressure at last reading (before eserine was used) and in only six was this elevation more than 3 mm. Hg. Of these five, the pressure in two (no. 5) was very low initially and did not rise over a low normal. One (no. 3) rose

to a high normal from a low normal and two (no. 16) from a low normal to a medium normal, but with eserine came back to the original pressure. In four eyes the pressure initially was 30, 31, 31, and 32 mm. In two (no. 6) of these there was a very satisfactory drop of 11 and 13 mm. Hg with a subsequent rise to 3 mm. below the initial pressure after eserine. In two (no. 19) there was no appreciable change through eserine and neo-synephrine. Of the 10 eyes to show any rise there were only three with an initial pressure over 20 mm. Hg. In no eye with a high normal pressure was the pressure increased.

Thus in the nonglaucomatous eyes 80 percent had their pressure reduced by 0.25-percent neo-synephrine. In no case was the pressure elevated to the danger zone. The pressure rise was greatest in those cases subnormal at outset. Only 36 of the 50 eyes had tension readings made after eserine but in these, nine showed an elevation of tension, 14 a depression, while 13 were unchanged from the last reading before eserine. The greatest rise was 5 mm. and the average 2.66 mm., while the greatest fall was 9 mm. and the average 4.07 mm. Hg.

*Mydriasis.* Fifteen minutes is sufficient in many eyes to produce mydriasis adequate for ophthalmoscopy, while 30 to 45 minutes was needed for sufficient exposure of the lens to allow microscopy. If eserine is used when the pupil reaches 6 mm. a sufficient mydriasis is attained for microscopy before miosis sets in. In all cases mydriasis was overcome and in all but one within 45 minutes, in most of them within 15 minutes. Eserine 1 percent was quicker and did not cause unpleasant symptoms. In several cases solutions of 1-percent and of 2-percent neo-synephrine have been used for mydriasis with corresponding rapidity of results. The 2-percent solution has been especially helpful in securing a rapid maximal dilation after trauma.

From this table the need to use eserine with neo-synephrine would seem open to discussion. However, in two preliminary cases of glaucoma treated one with epinephrine bitartrate and one with neo-synephrine a pressure elevation was recorded accompanied by extensive mydriasis. These effects were satisfactorily reduced later by miotics and epinephrine.

The cases of glaucoma reported are in themselves insufficient to justify any observation as to dosage or uniformity of results. However, the results certainly justify further study of neo-synephrine and the preparation of statistical tables on the basis of which comparison with the effect of other epinephrine products can be made.

In the first of the glaucoma cases no uniformity in the treatment existed but a tentative routine has now been established for the sake of comparative study. Naturally, there is no routine that will fit all cases but in a future study an identical procedure will be used as far as possible, with the recording of pressure and size of pupil before treatment, the same after eserine, and the same at intervals after neo-synephrine.

The presentation here is best made by case record in which for the sake of brevity only the effect of the use of neo-synephrine is given along with sufficient data to show the type of patient. These have been selected to show the results after a variety of strengths and amounts and represent the first few experimental observations.

Case 4 compares the result of one drop of 1 percent against 2 percent, also against repeated 0.25 percent solutions.

Case 3 is included because of the marked initial rise from pilocarpine,

though the pressure was later controlled by pilocarpine 1 percent four times daily until the focal infection was removed.

*Case 1.* T. V. G., aged 75 years, had glaucoma simplex, O.S., on August 13, 1935.

A. Tension was 70 mm. Hg and the patient had been on pilocarpine 1 percent for 10 days with no result. One-percent eserine and neo-synephrine 1 percent were administered, the neo-synephrine being repeated in 10 minutes. Ten minutes after the second drop the tension was 55 mm. Three-and-one-half hours later it was 50 mm. Then three drops of 1-percent neo-synephrine at 10-minute intervals were given and tension dropped to 27 mm. Hg.

B. On August 29, 1935, the intraocular pressure was 60 mm. Hg. Three drops of 1-percent neo-synephrine at 30-minute intervals brought the pressure down to 38 mm. Hg 30 minutes after the last drop.

*Case 2.* R. S. M., aged 58 years, had acute glaucoma and acute bullous keratitis. The history suggested glaucomatous attacks for three years. The intraocular pressure was 48 mm. Hg. Two drops of 1-percent neo-synephrine at 30-minute intervals without eserine brought the pressure to 29 mm. Hg 30 minutes after the last drop.

*Case 3.* This patient was 64 years old and had toxic secondary glaucoma. The tension was 30 mm. Hg, and after the use of 1-percent pilocarpine the pressure rose to 44 mm. Hg in 30 minutes. Then 0.25-percent neo-synephrine brought the tension to 25 mm. Hg in another 30 minutes. On a later date a tension of 29 mm. Hg under pilocarpine was reduced by three drops of 0.25-percent neo-synephrine 10 minutes apart to 16 mm. Hg 10 minutes after the last drop. Two hours later the tension was still 16 mm. It was subsequently controlled by removal of the focal infection and the use of pilocarpine.

*Case 4.* W. H. L., aged 44 years, had chronic secondary glaucoma in the left eye and a secondary cataract.

The history and findings in the field of the right eye suggested that the left eye might have a toxic glaucoma with optic neuritis, also that there had been in the past bullous keratitis. This eye had a fixed pupil, scleral ectasia, exceptionally shallow anterior chamber, and no light perception. The tension was 55 mm. Hg. One drop of 1-percent neo-synephrine brought the tension to 44 mm. in 30 minutes. The patient returned six days later after using 1-percent pilocarpine five times daily with an intraocular tension of 55 mm. This was reduced by one drop of 2-percent neo-synephrine to 45 mm. in 30 minutes. One week later the tension in the left eye was 50 mm. Hg. Three drops of 0.25-percent neo-synephrine at 10-minute intervals reduced the tension to 32 mm. 10 minutes after the last drop. One hour later the tension still was 32 mm. Hg. Three drops at 10-minute intervals were used. One hour after the last drop the tension was still 32 mm.

These cases show that in glaucoma the use of neo-synephrine does cause a fall in tension apparently best secured by the repeated use of weaker solutions. The results are sufficiently encouraging to justify further study, which is being undertaken. Glaucoma secondary to focal infection and accompanied by a mild optic neuritis has responded satisfactorily. While cases of this type are not truly glaucoma simplex, the differentiation from glaucoma simplex can be made only by central color fields and the response to the removal of focal infection.

## Conclusions

In ophthalmoscopy neo-synephrine has the properties of other epinephrines. It produces mydriasis as quickly, as fully,

and as safely as any mydriatic. It is non-irritating. It is stable. It will reduce tension in the glaucomatous and in the normal eye. It may elevate the tension as will other epinephrines but in a very limited experience this has not occurred in glaucoma if some miosis was maintained with eserine.

*Frisco Building.*

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# THE O'CONNOR CINCH-OPERATION TECHNIQUE

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On the assumption that the O'Connor cinch-shortening operation is not more widely used outside of California because the finer points of technique, upon which its success depends, are not well understood, this paper discusses the use of various essential instruments and the refinements of the procedure. Read before the Ophthalmological Section of the California State Medical Association in Coronado, May, 1936, and rewritten to include points brought out in the discussion.

McReynolds is credited with having made the statement that every oculist who has insomnia devises a new operation for squint; and that all oculists have insomnia. Those who have not used the O'Connor operation are evidently of the opinion that it belongs in this classification, while those of us who have used it for many years believe that it should be used in a very high percentage of, or in all, muscle-shortening operations. The proportion of O'Connor operations performed in San Francisco, to all other types is surprisingly large. This proportion in any other city seems to vary inversely as the distance from the Golden Gate. In the words of the politicians, "Let us look at the record."

Since O'Connor has no connection with either of the large San Francisco medical schools, it would seem fair to investigate the ocular-muscle operations performed in their hospitals. These records have been made available through the courtesy of the respective department heads. It would seem fair also to assume that Cordes and H. Barkan are both familiar with all of the popular operations for this condition. Regarding muscle-shortening operations performed at the University of California Hospital, Cordes reports Reese resections 100, and O'Connors 127, from July, 1928, to 1935. He elaborates as follows, "As you know, most of the shortening operations were also combined with either a tenotomy of one kind or another, or a recession. The O'Connor operation was done exclusively as a shortening procedure from 1929 to 1934. Since then we have reverted to the Reese resection in cases of marked strabismus, particularly where surgery was resorted to primarily for cosmetic reasons. In a fairly high percentage of these cases, we have found one operation sufficient to correct the defect. In others, it has been necessary to do a little more. In this type, an O'Connor has been performed on the opposite side." Regarding the situation at Stanford University Hospital, Barkan states: "In the last five years on our clinic service we have done a shortening of one muscle and a partial tenotomy or recession of the opponent in 164 cases. In 161 of these, or 98 percent the O'Connor technique for the tendon to be shortened was used. There were six additional cases of muscle transplants in which the O'Connor technique for transplants was used. With this record, it scarcely needs to be said that we consider, at Stanford, that no operation is so satisfactory as the O'Connor hitch, for increasing the action of the weaker muscle by shortening the tendon." May I emphasize that in the Cordes series, operations other than O'Connor's were used in cases where the desire was for a purely cosmetic effect?

It seems perfectly obvious that the operation in question is by far the best for correction of phorias. McCool has shown that by this means it is possible anatomically to shorten a rectus muscle 10 mm. Allowing for the usual slipping of sutures in all other types of operation,

can we expect more than 1 cm. or one quarter of the length of the muscle, of actual shortening?

The question then arises, why is it not used everywhere? I believe that the explanation lies in the fact that the technique seems strange to operators who have never tried it, or who having tried it once, without fully understanding the technique, have abandoned it. Hosford described fully the principle of the operation, and it is my purpose to mention or emphasize those finer points of technique that make for a successful operation.

It seems logical to assume that postoperative reactions would be minimized by making the conjunctival sac as nearly sterile as possible. To this end, patients are given some antiseptic drop to use in the eye for a few days before operation, although this is probably of very little importance.

The proper instruments are of the greatest importance, and it is practically impossible to operate successfully without them. O'Connor's large squint hook upon which the entire tendon insertion can be held perfectly flat, in its normal relation to surrounding structures, is indispensable. So also, is his sharp curved hook, for splitting the tendon into equal bundles of fibers. The Wescott-Stevens scissors, which can be used with almost the facility of a pencil, is a most satisfactory tool. In transferring the loops of dermal to the tendon, I use an ordinary forceps to make counter pressure on the edge of the tendon, but Hosford's special forceps for this purpose is doubtless better.

Special dermal sutures are now supplied, which have no tendency to curl. Ordinary dermal stretched between two fixed points, like the handles in a sterilizer, or two nails on a stick of wood, may be boiled for five minutes. This makes the dermal perfectly straight, and it is much easier to use. Hosford's needle seems easiest to use when several shorteners are necessary. When only four to six are needed, I favor O'Connor's method. He threads the double dermal sutures through a metal eustachian catheter, allowing the ends of the dermal to protrude about 1.5 cm., all of them being of exactly the same length. To the tips is applied a small drop of "metallic X cement." When this dries, more is applied, until the tips of the sutures and the cement form a dull tip about 1.5 cm. in length and less than 1.0 mm. thick; a satisfactory substitute for any needle. In either method, silk sutures are tied to the doubled dermal ends away from the needle, so that when the operation is finished, instead of having the ends of the dermal sutures protruding into the conjunctival sac, there are silk sutures, attached to the dermal; the dermal being as usual within the loops of tendon fiber, and the silk in the conjunctival sac. It is well to use different-colored silk sutures for each doubled strip of dermal, since it facilitates the removal of two dermal shorteners alone, if there should be an overcorrection.

It is impossible to lay too much stress upon scrupulous cleanliness. To prevent their falling into the conjunctival sac, the lashes should be cut off with a scissors dipped in vaseline. The field should be thoroughly cleaned with soap and water, and the stubs of the lashes freed from any secretion by means of a toothpick applicator moistened with benzene. Antiseptics at the time of operation are of doubtful value and may be actually harmful by destroying the protective lysozyme normally present. It is sufficient to irrigate the conjunctival sac with sterile normal salt solution. If there should be even a slight conjunctivitis, one is well advised to postpone operation, since it is probable that some of the reactions reported following this operation have been

due to the violation of this rule.

The eye having been isolated by sterile towels, the speculum is inserted through a slit in a piece of rubber tissue and placed so that the lids and lashes are covered by the sterile sheet of rubber. Gloves are apparently superfluous, since O'Connor never uses them. Nevertheless, I have always worn them, except on two or three occasions when I assisted him. They do not seriously interfere with delicate work, and certainly can be made more nearly sterile than the human hand. One should be careful to wash off all powder or other foreign material, both from the gloves and the rubber tissue previously mentioned, since this is irritating.

In shortening the external rectus, a vertical incision is made in the conjunctiva about 12.0 mm. behind the limbus, and the conjunctiva gently undermined. This incision should be the smallest one through which one can work satisfactorily. Tenon's capsule is grasped with a small forceps at the lower border of the tendon, and a small incision made through to the sclera. With the small hook the tendon is then located, whereupon the large hook is substituted, placed so that the entire tendon insertion lies upon it. With this as a guide, the tendon is cleanly dissected out, with the minimum of trauma or pulling. Unless the overlying capsule is completely removed from the tendon fibers, the operation will be a failure. This is easily done by first incising it vertically along the insertion, then dissecting it off cleanly in one piece. On several occasions I have seen surgeons using either gauze or dry cotton for sponges. This should never be done in any ocular operation, especially not in this one. Following such technique in experimental surgery, Hosford has demonstrated, microscopically, small bits of cotton in the tendon fiber. Such foreign bodies produce severe reactions; therefore moist, tightly rolled cotton sponges should be used exclusively. It is worth while to take sufficient time to stop all small bleeders with gentle pressure by sponges soaked in adrenalin, or pressure between the blades of a forceps. O'Connor has suggested the use of diathermy for this purpose, but I have had no experience in this method. In placing the shorteners, the aim should be to minimize trauma and the handling of tissue, especially in transferring the loops. The conjunctival incision is closed by an untied running suture of fine silk, a Gruss nontraumatizing needle being employed. Unless an overcorrection has been produced, the dermal sutures with their silk appendages should remain in place at least two weeks. No more than eight medium dermal shorteners should be used in any case. For the first few hours following operations, I have found it wise to use a cold pack over the eye, for 10 minutes, every two hours.

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# NOTES, CASES, INSTRUMENTS

## SYMPATHETIC OPHTHALMIA

### Report of a case with recovery

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A boy, aged 11 years, was first seen at the Minneapolis General Hospital on December 18, 1934, complaining of blurred vision in the right eye. The left eye had been injured and was totally blind. On October 28, 1934, while playing near a field, he was accidentally hit in the left eye by a buckshot fired by a pheasant hunter. The shot entered the temporal side of the orbit, penetrated the eyeball, and made its exit at the nasal margin of the limbus. The eye became blind immediately and a local physician was called. Atropine was used daily and the condition improved. On December 17th, seven weeks after the injury, the patient noticed that the vision of the right eye was slightly blurred, and on the following morning the right eye was slightly reddened, sensitive to light, and teared somewhat. The physician then advised immediate enucleation of the left eye.

That day, December 18th, on admission to the General Hospital, examination revealed a blind left eye with ciliary injection, scarred cornea, anterior chamber filled with exudate, and an invisible fundus. The right eye had 10/200 vision, low tension, mild ciliary injection; the pupil was responsive to light and accommodation, and there was slight ciliary tenderness. The general physical examination was negative. Wassermann and Kahn tests were negative; hemoglobin 79 percent, red blood cells 4,100,000, white blood cells 10,300, polymorphonuclears 85 percent, leucocytes 14 percent, mononuclear leucocytes 1 percent. The urine was normal.

The left eye was enucleated within two hours of admission. The microscopic examination revealed a very edematous iris, heavily infiltrated with lymphocytes, and numerous giant cells at the ciliary border. The stroma of the ciliary body showed nodular collections of lymphocytes, plasma cells, and epithelioid cells.

Autogenous blood serum was given intramuscularly on December 18th, and the whole blood on December 21st and 23d, together with atropine and salicylates. The patient was discharged December 29, 1934, as improved. Vision was 10/200.

On January 8, 1935, he returned to the out-patient department with a recurrence of the symptoms. He was immediately referred to the hospital and given a course of intravenous injections of typhoid vaccine; the resultant temperature reactions were satisfactory. The injections were followed by autohemotherapy, together with atropine and salicylates. Because the patient wished to leave the hospital for a while, he was discharged unimproved on March 25, 1935. Vision was ability to count fingers at four feet; the fundus was not visible owing to a cloudy vitreous.

The patient returned to the hospital on March 29, 1935, and a course of intramuscular injections of milk was administered, which gave him high temperature reactions. There was an immediate improvement in vision and clearing of the vitreous, then vision again dropped to finger counting at four feet. A patient who had suffered from sym-

pathetic ophthalmia a year or so previously was found and three intramuscular injections of this patient's whole blood were given with no results.

Artificial fever by means of a General Electric diathermy unit was resorted to on May 4th. The temperature rose to 105 to 107 degrees rectally and was sustained over a period of three hours. On May 6th the fundus was more clearly visible than for several weeks. On May 8th, the patient could count fingers at 15 feet and was discharged for a consultation with Dr. Frank E. Burch, who reported a favorable prognosis. He was readmitted six days later, the vision having fallen to finger counting at eight feet; the fundus was not visible because of a cloudy vitreous and there was an increase in the number of K.P. He was given more intravenous injections of typhoid vaccine, atropine, and heat, along with phototherapy with no improvement. On May 18th, another diathermy treatment was given and two days later the fundus could again be fairly well seen and vision had improved. Three more such treatments were given and the patient was discharged on June 19, 1935, with a fairly quiet eye and improved vision.

His course of progress was followed in the dispensary and improvement was steady. A refraction test on November 7, 1935, enabled the patient to obtain 20/20—3 vision with —5.50 D. sph. ⊂ —.75 D. cyl. ax. 165°. Examination of the eye revealed K.P. still present on the cornea, some vitreous floaters, normal fundus, normal tension, and a reactive pupil. The visual fields were normal for form and colors.

The patient was seen at intervals of one month and the vision remained 20/20 until January 29, 1936, when he was readmitted to the hospital complaining of some dimming of vision. The fundus was not visible, there were vitreous floaters, and the vision was 20/40 with glasses. Atropine was used for four days but discontinued when it was noticed that its use seemed to irritate the eye. Diathermy treatments were given on February 4th, 11th, and 19th, the temperature reaching 105, 105, and 106 degrees, respectively. No other medication, either local or general, was employed. On February 5th the floaters had almost disappeared and on February 16th the fundus detail could be seen. The patient was discharged February 28, 1936, with vision of 20/20 with glasses. At the last examination July 24, 1936, the vision was 20/20—1, and the media were clear.

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## PROGRESSIVE MUSCLE CHART

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The following chart is offered as a concise and graphic method of recording ocular-muscle deviations. Provision is also made for the plotting of successive changes; in this sense the chart is progressive.

The ordinate represents the deviation in prism diopters and the abscissa records the dates.* The deviation is recorded by drawing a line from the center of the squinting eye to the space on the chart representing the prism diopters of deviation. In the example shown the right

* Theoretically, the lateral spacings should represent equal time intervals, but when the patient does not report regularly, that would necessitate leaving many of the squares blank and the chart would become unwieldy. It has been found more expedient simply to record successive findings in successive squares, regardless of the scale of the time element.

eye converged 12 prism diopters for distance and 25 prism diopters for near, at the first examination. If the squint is monocular, the other eye is shown to be straight by drawing a line along the zero line. In the case of alternating squint, the total deviation is best shown as belonging to one eye and checking the word "alternating."

The cover test (screen test) is recommended as the most accurate measurement of the deviation. In any event, the same test should be employed each time. The wearing of glasses, the performance of an operation, and other pertinent remarks may be made directly upon the chart.

*40 East Sixty-first Street.*

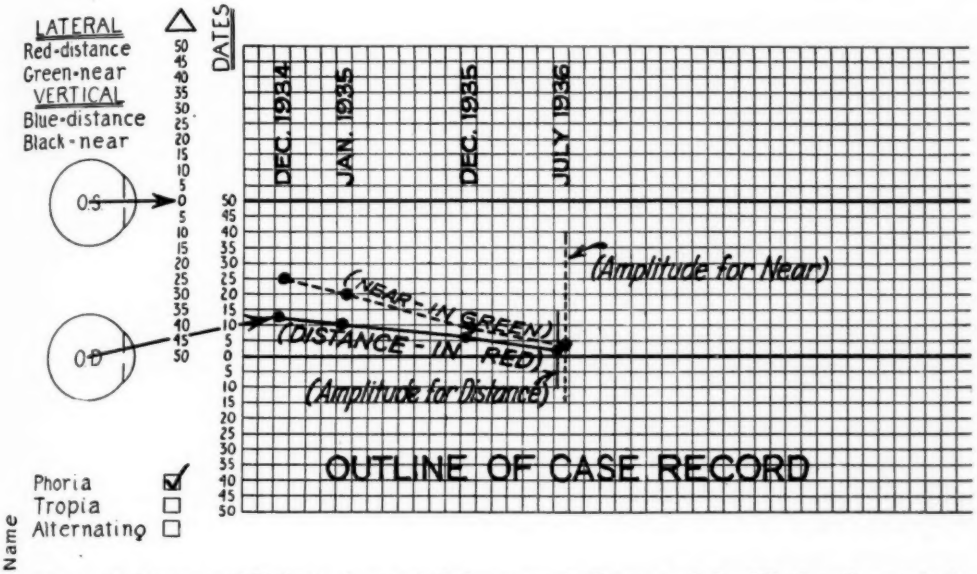


Fig. 1 (Knighton and Kelley). A muscle-balance graph. Because of the difficulty of reproducing colors the chart is recorded in ink. The solid line represents the lateral deviation for distance and the broken line that for near. The fusion amplitude for distance is shown by the extent of the vertical line running through the dot which represents the esophoria of the right eye; the amplitude for near runs through the dot which represents the near imbalance.

A red mark is used to show the lateral imbalance for distance, and green for near. Vertical deviations can be shown in blue and black for distance and near respectively. The amplitude of fusion (prism convergence and divergence) is easily shown by a vertical line of red for distance and green for near. These colors were chosen because they are provided in the Norma 4-color pencil.†

† The chart and pencil may be obtained from J. Hayden Twiss, 155 East Forty-second Street, New York City.

## THE HISTORY OF OPHTHALMOLOGY

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*Chicago*

Ophthalmic achievements are adequately understood only in terms of their evolutionary story. The earlier concepts were mainly the results of empiricism and speculation. The experimental method began to take form about three centuries ago, but it is only in the last hundred years that institu-

tions for organized research have been established.

The history of ophthalmology offers among others the following incentives to reflection: (1) Practical procedures begin as observations of purely academic interest. Necessarily so, there cannot be applied science unless there is science to apply. (2) Accident has given the clue to many a notable discovery, such as cataract expression, local anesthesia, X ray, but only a prepared mind and the zeal for research has ever visualized the significance of the accident and worked out its possibilities. (3) Progress depends on accumulated science and technology. No electric ophthalmoscope was possible until miniature electric bulbs had been invented. (4) The cultural advancement of the time determines the assimilation of new ideas and encourages their invention. When "the time is ripe" the same discovery has been often almost simultaneously announced by independent investigators. On the other hand, contributions ahead of their age have languished for want of contemporary appreciation and not infrequently waited years for rediscovery. (5) The evaluation and popularization of significant innovations are among the major responsibilities of scientific leadership. Otherwise the pioneer may be unable to overcome the skepticism of his peers, the indifference of the self-satisfied, and the hostility of the reactionary. Brisseau discovered the true nature of cataract, but it was the support of Maitre-Jan that gave the conception the vitality which determined the epoch-making operation of Daviel. Helmholtz created the ophthalmoscope, but it was Graefe's insight, force, and prestige that gave it vogue.

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## SPONTANEOUS EXPULSION OF CATARACT NUCLEUS*

CARL BEISBARTH, M.D.
*Saint Louis*

In August, 1932, I was consulted by Mrs. W. H., aged 64 years, who gave the following ocular history: When 12 years of age the eyes were severely infected. The patient stated that she had been "blind" for one year. When recovery finally occurred the right eye "had a gray scar on it" and was sightless. The left eye though scarred retained fairly good vision. With changes of glasses at intervals of two to three years, always on the prescription of an oculist, this eye continued to have fair acuity.

*Examination.* Right vision, light perception only; left vision, 6/12 with —2.25 D. sph. ⊂⊃ + 4.00 D. cyl. ax. 87°. The eyes were white and without pain. The right cornea was completely opaque except for a narrow strip near the limbus, nasally. The left cornea had a dense superficial and deep irregular opacity. Several small, apparently calcified deposits were seen on or near the surface. The pupil was not completely covered by these scars, which accounts for the improvement in vision. Glasses were prescribed. With a +3.25 D. sph. added, the patient was able to read ordinary print without great difficulty.

I did not see the patient again, professionally, until October, 1934. At this time she stated that the vision did not seem clear and she thought that she needed a change in the lens. With the best correction, now —1.25 D. sph. ⊂⊃ + 1.75 D. cyl. ax. 180°, vision was 6/20. The noteworthy change in refraction was at first thought to be solely due to a change in the corneal scar, which was

* Read before the St. Louis Ophthalmic Society, Oct. 23, 1936.

larger, the calcified area white and flaky. With the slitlamp, however, a small amount of flocculent material in clumps could be seen in the anterior chamber, which appeared to be of normal depth. The visible iris had a moth-eaten appearance. The tension was 41 mm. Hg (New Schiötz). The Bailliart tonometer reading was 45 mm. Hg corneal and 60 mm. Hg scleral. The accuracy of these tonometric readings was, however, doubted because of the deformation of the cornea from scarring. The visual field showed a very slight concentric contraction.

For the next two months the patient was seen at frequent intervals, the tention varying from 35 to 48 mm. Hg (New Schiötz). Miotics did not reduce the tension. Moreover the vision was greatly lowered when they were used, probably because the contracted pupil was entirely behind the corneal scar.

On December 21, 1934, a 10-percent solution of epinine was used (equivalent to a 1-percent solution of epinephrine). The following day the cornea showed increased cloudiness and vision was reduced to 2/64. Tension was 60 mm. Hg (New Schiötz). Hot applications for a period of four days improved the vision to 6/32, but the cornea remained very cloudy. There was only occasional slight pain. I did not dare to take the tension with the tonometer on account of the condition of the cornea.

At this time (December 26, 1934) a general examination revealed a toxic thyroid. The pulse was extremely fast and the basal metabolism rate +62. After several days of rest the cardiac condition was sufficiently improved to warrant subtotal thyroidectomy, which was performed on January 21, 1935. Convalescence was surprisingly uneventful considering the age of the patient.

For the next few months the eye was quiet; vision was 6/32. The tension rose gradually, however, and on August 1st it was 68 mm. Hg (New Schiötz). Several injections of 2 c.c. of adrenal cortex extract were given intramuscularly without effect on the tension. On August 14th, I did a broad basal iridectomy above, making a scalpel incision under a conjunctival flap. Two sutures were inserted. There were no operative complications. On discharge from the hospital August 16th the tension was 22 mm. Hg (New Schiötz). The anterior chamber was very shallow.

During the next two weeks the tension ranged between 25 and 36 mm. Hg, and increasing cloudiness of the lens was noted. A note was made on my history sheet that the eye was quieter and would probably later require an operation for cataract.

On September 19th, the eye began to be painful and on the next day I received a phone call from the patient's daughter saying that her mother had had excruciating pain in the eye all night and that in the morning "something had come out of the eye." When the patient wiped her eye she felt a particle "like a seed" which was loose between the eyelids and she had saved this particle. The daughter was told to place the patient in bed with the eye lightly padded and to bring the particle to me. On her arrival at the office a few minutes later she presented me with the cataract nucleus on a piece of gauze.

When the eye was examined a small round hole was seen just above the limbus exactly at the twelve o'clock position, through which a small tag of capsule was protruding. Three days later the patient was hospitalized again. I reopened the small hole and enlarged it laterally with scissors. With a spoon, several scoops of lens substance were removed and a large piece of capsule grasped with capsule for-

ceps. A small quantity of lens substance was irrigated away and one suture inserted.

At the present time the iris is drawn upwards and the pupil entirely secluded. The eye is now white, painless and tension is 25 mm. Hg (New Schiötz). Vision is light perception only but projection is good. It is hoped that some vision will be obtained after the next operation planned; namely, an iridotomy or an iridectomy below at the site of the clearest portion of the cornea.

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# SOCIETY PROCEEDINGS

EDITED BY DR. H. ROMMEL HILDRETH

## ROYAL SOCIETY OF MEDICINE, LONDON

### SECTION ON OPHTHALMOLOGY

March 13, 1936

MR. RANSOM PICKARD, *president*

#### MENINGIOMA OF OPTIC NERVE

DR. RUSSELL BRAIN and MR. HUGH CAIRNS showed a case of this condition. Mr. Cairns said that at the operation he found a tumor the size of a walnut inside the cranium, in appearance like a suprasellar meningioma, and another of the same size in the orbit itself. The roof of the orbit was taken away, the orbital tumor removed from behind forwards, and in pulling on the orbital tumor he found that it extended almost to the back of the eyeball. There was an extension of the tumor in the subarachnoid sheath of the optic nerve to the eyeball itself.

#### GLIOMA RETINAE TREATED BY RADON SEEDS

MR. H. B. STALLARD said that when the boy was two-and-one-half years of age his left eye was excised on account of glioma retinae. A large growth was found in the lower quadrant of the remaining eye, in the 3-o'clock meridian. Mr. Stallard sutured four radon seeds to the sclera under a conjunctival flap, spaced 7 or 8 mm. apart, because a previous investigation had shown that a destruction of growth occurred to a distance of 4 mm. round the seed. In two months the growth had melted away: that was in August, 1934, and since then there had been no sign of recurrence. There were some grayish exudates around the macula, which appeared a year after the treatment. The boy could see and describe dogs a quarter of a mile away. The father had had glioma retinae in both eyes. When 14 months of age his left eye was excised on this account, and Mr. Stevenson and Mr. Holmes saw two small islands in the other eye, but the mother refused operation on it. At four years of age he had contracted scarlet fever, and then the two areas of growth disappeared. The other child of this family was now two years of age, and had both eyes filled with glioma, a condition noted at birth. There was no useful retina. He was treated with a scarlet-fever serum, but proved to be immune to it. He had had globulin injections, and subsequently his left eye perforated.

#### SARCOMA OF THE CILIARY BODY

MR. H. B. STALLARD presented the case of a man, aged 24 years, who came in August, 1935, with a growth which extended from the 2-o'clock to the 6-o'clock meridian, and into the vitreous as far as the mid-plane of the eye. He advised the man to have the eye removed. After visiting other hospitals and receiving the same advice, he returned and said he had heard about radium and asked that it be used on him. The risks were explained but he said he would take them. Mr. Stallard sutured three individual two-millicurie seeds to the sclera, 8 mm. apart. In the ensuing two months the growth became smaller and less tense, and as it then changed no further, he advised removal, and this advice was supported by Mr.

Foster Moore. It was declined. He therefore inserted two radon seeds into the growth through incisions in the sclera. The growth was now smaller than formerly and more translucent than deeply pigmented growths usually were. But sarcomata were much more radio-resistant than gliomata, and it was still believed that he ought to have the eye removed.

### Aneurysm of posterior communicating artery

Dr. Russell Brain and Mr. D. W. Northfield showed a case of this condition. Dr. Brain said that cases of intracranial aneurysm are far more common than they were thought to be even 10 years ago. The onset of the ophthalmoplegia is often sudden, and there is an associated severe headache, owing to leakage from the aneurysmal sac. In a smaller number of cases there is a progressive nerve palsy and an insidious onset of symptoms with little or no headache at first. In adults of about middle age who develop a third-nerve palsy not due to syphilis or intracranial tumor, one should think of the possibility of intracranial aneurysm.

Mr. Northfield said that the internal carotid was ligated by means of two strands of No. 2 silk, and since then there had been a progressive and fairly rapid improvement, both as to ptosis and in the inward and downward movements of the right eye. The pupil was still more or less completely fixed with regard to both light and accommodation. There arose the question whether any of the hemorrhage was due to cerebral anemia, or to thrombosis and embolism. Following ligation usually no signs of paresis develop for several hours: if intracranial signs develop immediately and ligature is applied, it is evidence of true cerebral anemia, and the ligature should be removed immediately or else replaced by one which only partially closes the artery: later it may be tightened. If the ligature is removed within six hours after the operation, any hemiplegia that developed would disappear. This woman developed signs of slight contralateral facial paresis, but at the end of four hours it had disappeared. There seems to be no danger arising from the use of thorotrast if no more than 15 c.c. is injected: there is no evidence that it has a toxic effect on the body generally.

### Third-nerve palsy following dental extraction

Dr. Russell Brain avoided the phrase "caused by" as the occurrence of the palsy after the tooth extraction might be a coincidence, though this was the fourth case he had seen of the kind. The tooth extracted was a right upper lateral incisor, and two days later diplopia developed, and two days later still the right eyelid drooped, and pain was experienced behind the right eye. In a fortnight from the extraction there was incomplete ptosis of the right upper lid and the right pupil was dilated and fixed. In addition there were complete paralyses of external ocular muscles innervated by the right third nerve. The Wassermann test was negative. Two weeks later improvement set in, but remains of the palsy were still evident.

### Angiomata retinae (von Hippel's)

Mr. Humphrey Neame said that this woman complained of failing vision in the left eye for three months. Her vision is right eye 6/5, left eye 4/60, with correction. In the right eye was a small angioma in the periphery; in the left were two adjacent angiomata of different sizes. The left eye was treated by electrolysis, a fine, sharp, round needle

being used. Mr. Neame experienced difficulty in perforating the sclera. The effect was noticeable in the mottled pigmentation in the neighborhood of the angiomata. A special needle had been prepared, with a cutting edge and insulated shank, with the view to reapplying electrolysis in a similar way to that employed for dealing with spider nevi of the skin.

### Mustard-gas keratitis

Mr. Harold Ridley said that this patient, a man aged 56 years, was, in 1918, gassed in the War by mustard gas, and for 10 days was blinded by it. When examined for a pension in 1919 and 1921 the vision in each eye, with correction, was 6/6 and the corneae were said to be normal. Recently there had occurred a gradual diminution of vision. Both corneae now exhibited opacities in the interpalpebral fissures, especially in the central area. The epithelium was irregular, exhibiting a polychromatic luster suggestive of crystals. Also the corneal sensation was much reduced. Various cases of this kind have been published, and they vary according to the observer, but all showed slow, steady progress. The essential parts of the cornea are affected. There is no inflammatory change nor vascularization. Thickening of the nerve endings has been suggested as a cause.

### Wilson's disease, with Kayser-Fleischer ring

Mr. McArdle presented the case of a 17-year-old girl who had been admitted to the National Hospital for Nerve Diseases on account of an increasing tremor in the right hand which had been present two years; for four months speech had been indistinct. At 10 years of age there had been difficulty in walking, which was then attributed to rheumatic pains in the legs. She was backward at school and her memory was poor, and for four years she had been restless and timid. During the last five months she had had attacks of giddiness. She had a vacant expression, with some dementia. Her speech was slow, syllabic, and monotonous. A ring of golden-brown pigment could be seen near the limbus of the cornea, gradually fading off towards the center. Mr. Williamson-Noble reported on the slitlamp appearance to the effect that the brown pigment formed a definite ring about 5 mm. wide, starting 1 mm. from the corneal margin. Between the outer edge of the ring of pigment and the margin of the cornea was a ring of greenish opalescent dots very closely set together. The girl had a marked coarse rhythmic tremor of the right hand and arm, and this was absent when the arm was at rest; it was increased by excitement or voluntary movement. There was also a less noticeable tremor of the left hand. The reflexes, however, were all normal. The Wassermann was negative for both cerebrospinal fluid and blood. The levulose-tolerance test was normal. The girl's mother was quite normal, but the father had not yet been seen; both his grandfather and sister had died in asylums. This patient had three sisters, aged 11, 4, and 2 years, respectively, the eldest of these being very backward.

*Discussion.* Dr. J. G. Greenfield said he and his colleagues had examined two specimens from cases of this kind in the laboratory and found that the pigment was confined to the upper part of Descemet's membrane and did not reach to the edge of the cornea. It consisted of very fine granules, less than one micron, in size. Some thought these might be silver, others that they might be copper. They did not correspond to any of the known pigments derived from the

blood, but were closely allied, particularly in their insolubility in weak acid and their solubility in alkalies, to malarial pigment which was derived from blood. It might be some hemoglobin-derived pigment.

(Reported by H. Dickinson).

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## OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM (ANNUAL CONGRESS)

April 2, 3, 4, 1936

MR. R. FOSTER MOORE, *president*

### OPHTHALMIA NEONATORUM

Mr. J. D. MAGOR CARDELL (Hon. Secretary), opening the discussion, quoted from the second edition of "Rosengarten," published in 1545, as follows: "After the child is born, the cord cut, and the baby swaddled, the eyes should be carefully and frequently washed out with warm water." About the year 1800, Benjamin Gibson, of Manchester, laid down principles for the prevention of ophthalmia neonatorum; namely, "First, to remove if possible the disease in the mother during pregnancy: second, if that cannot be accomplished, to remove artificially as much of the discharge as possible from the vagina at the time of delivery: and, third, at all events to pay particular attention to the eyes of the child by washing them immediately after delivery with a liquid calculated to remove the offending matter or to prevent its noxious action."

Dr. H. P. NEWSHOLME, dealing with the public-health aspect, said that most people think of gonorrhea when ophthalmia neonatorum is mentioned, but in municipal work this kind is but one of various forms. Two sources from which knowledge of the existence of cases are obtained are the medical practitioner and the midwife, the former being required to notify the local authority of cases of purulent discharge from eyes of infants that has commenced within 21 days after birth. Though, owing to the varying degrees of energy shown by those engaged in the work, the incidence-rates vary; in Birmingham there has been a marked diminution in the last few years, of cases of severely impaired vision. The decrease of gonorrheal ophthalmia in Birmingham might be the result of three main factors: (1) a decrease in the prevalence of gonorrhea, (2) more efficient treatment, (3) an improved midwifery service, with better antenatal care.

With regard to prevention, the more freely and accurately women are examined the better. The Central Midwives Board has insisted on regular antenatal care by midwives, and prompt reference of any abnormality to practitioners for their advice. A one-percent solution of silver nitrate is instilled by midwives into the conjunctival sac after the mucus has been cleared away. On an inflammatory condition being detected, the midwife is required to summon medical help, and if there is a discharge the case must be reported to the local authority.

Dr. S. H. BROWNING dealt with the bacteriological side. He said the progress in any given case must depend on the bacteriological findings: even the most skilful clinician must experience difficulty in deciding whether a case is one of pneumococcal, gonococcal, or other kind. He had not found treatment of cases by vaccines and serums satisfactory. In patients with both eyes affected both eyes tended to be cured at the same time, this appearing to suggest that the resistance of the body is raised, or else that local immunity has occurred in both eyes at the same time. The prospect of cure in a case depends largely on the constitution of the child. Syphilitic children with ophthalmia neonatorum fare badly: when in-

fected with syphilis only 48 percent recover without loss of sight, while 81 percent recover without such loss if they are not syphilitic. Recently, pneumococcus has been found more frequently in ophthalmia neonatorum and all eye diseases than formerly. He does not think that the presence of the pneumococcus in the conjunctival sac constitutes a special risk.

PROFESSOR MARQUEZ sent a communication which was read by the Hon. Secretary. The Professor said that in his view the means of fighting ophthalmia neonatorum are often carried to excess. Silver nitrate is the great stand-by, but the use of the silver nitrate stick is to be deprecated. Potassium permanganate, 1 in 4,000 twice or thrice daily is valuable.

SIR JOHN PARSONS considered that statistics based upon notification returns are practically valueless: the returns include many conditions that are not simple and cannot be placed under one heading. It would be a different matter if separate tables could be drawn up of gonorrheal cases that are quite benign. As to the methods to be used, as the standard of efficiency of midwives is now higher than formerly, the recommendation of at least one Prevention of Blindness Committee that Credé's method should not be used by midwives can be relaxed, and the matter left to the discretion of the individual medical officer of health.

Dr. A. J. BALLANTYNE (Glasgow) said that there is no noticeable diminution of cases of ophthalmia neonatorum in the Glasgow returns, but the severity of the average case is now very much less than formerly.

COLONEL SMITH (late I.M.S.) said there is only one method of dealing with the infected conjunctival sac: cut the outer canthus freely, and leave the eye open for the debris to escape: then scour it round, and make it as clean as possible. There is no risk of injuring the cornea.

Mr. MCCALLAN said that a large part of his experience was derived in Egypt, where gonococcal ophthalmia is very prevalent, but ophthalmia neonatorum very rare. The reason for this has never been explained, so far as he knew. It might be that since the children come with trachoma at an early age there is much granulation tissue, and the acute vascularization protects the cornea to some extent.

Mr. FRANK JULER said that in the general hospitals of London, ophthalmia neonatorum is now seldom seen, and it was difficult to procure a case of it to demonstrate to students. When he was a student there were always two or three cases of it in the wards. In a large maternity hospital, of 44,357 live babies delivered, 180 had ophthalmia neonatorum, and of 44,717 out-patient mothers delivered the incidence was 229. Yet a considerable proportion of the women were very poor, and some were unmarried.

Mr. RANSOM PICKARD said that in his region, comprising 70,000 inhabitants, there has been a decided decrease of serious results from ophthalmia neonatorum. In a number of late cases he suspected the damage was a chemical one and not due to the gonococcus.

Mr. CHARLES GOULDEN said that the damage done to eyes by streptococci was the most shocking of all. It was often taught that if in a case which came under skilled treatment with the cornea intact, the eye was lost it was the fault of the person treating the case. He had always held that there was one exception, namely, in eyes infected with streptococci, for in such, whatever one did, the eye seemed simply to melt away. When using nitrate of silver on the eyes of a baby it is important to neutralize the nitrate of silver, for the baby has no tears, and so the natural sodium-chloride neutralizing agent in adult tears is absent.

### Experimental heterogeneous corneal grafts

Mr. J. W. Tudor Thomas related an account of six experimental corneal grafts on rabbits, the transplanted tissue having been obtained from the corneae of animals of another species. One of the grafts was taken from a human cornea, the other five from corneae of cats. In each case the technique was similar to that which gave the best results in rabbits when homogeneous grafts were used, the grafts having shelving margins. He said that the study of these grafts leads to the conclusion that such grafts can unite, but, unlike successful homogeneous grafts, they do not remain transparent, but become vascularized. The blood vessels come from the iris if it is adherent, and by the growth of blood vessels through the recipient cornea from the limbus. The primary union of the grafts tends to be incomplete, and some loss of the graft tissue readily occurs. Its epithelium is lost and is replaced by a growth of epithelium from the recipient cornea, commencing in much less than two months. The epithelium is supported by a subepithelial layer of fibers consisting of new vascularized tissue derived largely from the stroma of the recipient cornea and from blood vessels, which can separate and isolate some of the superficial fibers of the graft stroma in the course of its formation. Behind the graft a layer of fibers is formed from the endothelium and deep corneal fibers of the recipient eye, and behind this there develops, in less than 14 months and more than three months a new posterior elastic membrane which is less than one third the thickness of the Descemet's membrane of the recipient cornea. The original-graft epithelium is lost, but its Descemet's membrane remains. The original stroma of the graft can, in part, still be distinguished as isolated fibers in the subepithelial zone, and in the posterior zone it remains largely excluded, by the growth of new tissue around it, as a mass of poorly staining fibers, fairly homogeneous in appearance, with few nuclei, and practically no blood vessels; hence warranting the conception of a tissue tolerated but largely ostracized by the recipient eye.

The practical application of these conclusions is to lend support to the view that heterogeneous corneal grafts should not be used for corneal transplantation in man.

### Radium necrosis of the cornea

Mrs. Philippa Martin said the time of onset of the necrosis depends on the intensity of the irradiation. In all forms the reaction is more severe and early after repeated irradiation or in the presence of sepsis. The earliest sign is a diminution of sensation, the response to touch with cotton wool being slower than in the normal eye. This may persist for months, even though the normal sensation be restored. After a few weeks or months the cornea may lose its luster. This is followed by a small superficial ulcer, which spreads slowly. Areas of this kind may coalesce until a large superficial ulcer is presented. Or the ulcer may extend by stripping up the epithelium, and in a few days the epithelium becomes split. Pain is most severe when there is a punctate infiltration. After some months a few points of degeneration may occur in place of the ulcer, and some deep striation may be seen. Apart from this the cornea may be bright and appear normal. In some cases severe necrosis comes on rapidly, and then the whole cornea separates. In such cases repeated irradiations have been carried out, and sepsis has been a complication. When true irradiation iritis is present the pain is severe. If there is a complaint of pain in the eye, a mydri-

atic should be used and its effect on the pain noted. In all cases in which massive irradiation is proposed, the pupil must be dilated with a mydriatic before the treatment is started, and its exact size noted. The degree to which the pupil dilates under the same mydriatic as before furnishes an indication of the presence or absence of iris reaction. Some cases have been treated by the radium bomb, that is, one gramme radium unit, and no trouble resulted: in one case there was a blunting of the corneal sensation, which lasted six months, after bomb treatment. Protection of the eye by a metallic screen is dangerous, as such screens become a source of secondary irradiation. Malignant disease treated by radium bomb is less destructive than if treated by interstitial radium and radium needles.

(Reported by H. Dickinson.)

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## COLORADO OPHTHALMOLOGICAL SOCIETY

April 18, 1936

DR. D. G. MONAGHAN, *presiding*

### SUPERIOR-OBLIQUE PARALYSIS BY CONTUSION

DR. W. H. CRISP presented a man, aged 40 years, whose left eye had been injured on February 17, 1936, by a violent blow from a very large chisel which he was striking while cutting off the body of an old automobile. Dr. Rex Murphy, the acting surgeon, through whose courtesy the case was presented, had recorded that when the patient was first seen the left eye was turned upward and slightly inward, and that it showed almost no vision. There was dilation of the left pupil, but some reaction to light.

Inspection and the Maddox-rod test showed marked deviation of the left eye upward. There was also apparently a decided weakness of the left levator muscle. But there was further a constant contraction of the right orbicularis, pointing to a protective mechanism against double vision. The patient acknowledged not even light perception for the left eye. Nevertheless this eye watered a good deal under prolonged examination by lateral illumination, although it was entirely free from congestion; and a malingering test, with the lids controlled by the examiner, showed vision of at least 5/15 for this eye. Apart from the deviation and the dilation of the pupil, the external appearance of this eye was entirely normal. The media were clear, the optic disc of good color, and the fundus otherwise normal. The proptometer reading for the two eyes was equal. There was no X-ray evidence of fracture.

*Discussion.* Dr. Melville Black expressed the opinion that the patient had sustained enough permanent injury to be entitled to substantial compensation.

Dr. Edward Jackson said that from the character of the injury, one would be led to suspect injury near the pulley. It is possible that there was a nerve injury and that there has not yet been time enough for recovery. The amount of diplopia is sufficient, however, to entitle him to compensation, although the amount of permanent damage cannot certainly be estimated yet. Dr. Jackson suggested investigating conditions around the pulley at operation.

Dr. E. M. Marbourg said that he had seen the patient soon after he was injured. He believes that the loss of accommodation is probably permanent.

Dr. R. W. Danielson saw the patient a month ago. At that time, the pupil was widely dilated but it was under atropine. The eyeball rolled back independently of the lid. In his opinion, very little vision was present at that time.

The eye showed a traumatic enophthalmos and he felt that there was probably an injury to the optic nerve. The upper outer quadrant of the nerve seems whiter than normal at the present time.

Dr. W. M. Bane said that in his opinion the movements of the left eye were less complete than those of the right eye and that a rectus and the levator were probably involved rather than the superior oblique.

Dr. W. H. Crisp replied that in his opinion the superior oblique muscle had sustained injury. He had advised an operation to advance the inferior rectus. Probably it will be necessary to supplement operation by prescribing prisms.

### Chemical cyclitis

Dr. G. R. Hageman reported a case of iritis in a man, aged 60 years, a sugar-factory employee, who got some crushed barium rock into his left eye. The vision was 20/200 and the tension 48 mm. (Schiötz). Eserine was instilled, which aggravated the pain. Then atropine was used and the pain was relieved, but the following day the vision was only 20/400. The patient was seen by Dr. F. R. Spencer who advised the continued use of atropine and dionin. The vision steadily diminished until the patient could only count fingers at three feet. His general condition was good, the blood pressure normal, as was also the blood count. The teeth, tonsils, and sinuses showed no focal infection. After the use of foreign-protein therapy the vision improved in two or three weeks to 20/30. The tension remained at 35 to 40 mm. Then the patient developed a severe cold and his vision decreased. The use of atropine was begun again. At this time, Dr. W. H. Crisp examined the patient for the Industrial Commission. His tension was 50 mm. (Schiötz) and eserine was instilled for a week. There was only moderate improvement in his condition. Rapid improvement in vision (up to 20/20) followed the use of adrenaline packs. At present about one fourth of the iris is atrophic throughout its whole width. The tension now varies from 24 to 28 mm.

*Discussion.* Dr. C. A. Ringle reported that in sugar factories barium hydrozide is carried in the atmosphere and that the employees complain of irritation and smarting of the mucous membranes of the eyelids and nose and throat. It has a very caustic and lasting effect. Dr. Ringle expressed the opinion that a foreign body of barium could very easily be the cause of a chemical cyclitis.

Dr. Melville Black considered the case one of uveitis due to focal infection, with a secondary glaucoma. He believed that the use of atropine was the proper treatment and that miotics should not have been used. He advised the use of foreign-protein therapy if there should be a recurrence.

Edna M. Reynolds,
Secretary.

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## CHICAGO OPHTHALMOLOGICAL SOCIETY

April 20, 1936

Dr. Robert Blue, *president*

### Detachment of retina

Dr. John T. Stough presented a 34-year-old woman, first seen in July, 1933. Diagnosis at that time was of right and left posterior cortical cataracts, with a history of failing vision increasing in amount since February, 1933. In January, 1934, a right lens extraction with iridectomy was performed with the use of a spoon because of the

prolapse of a small amount of vitreous. Postoperative hemorrhage occurred three times with no ill results. On March 22, 1934, right vision improved to 1.2 with correcting glass; in July it was reduced to 0.2 because of a detachment of the lower half of the retina in which no tears could be found. An operation was performed on July 17th by the Walker micropin method with partial temporary reattachment. A second operation by the Safar technique was performed in October, with partial reattachment. On January 29, 1935, because of marked reduction in the visual field, a third micropin operation by Walker technique was performed, with marked improvement.

A hole in the vitreous membrane was found by Professor Karl Lindner, and on April 12, 1935, he performed an undermining operation, going back toward the macular region. This was followed by gradual improvement of vision to 0.8—2, which has now, 12 months postoperatively, been maintained for seven months.

### Phototherapy in diseases of the eye

Dr. Oscar B. Nugent said that short-wave infrared rays penetrate tissues deeply and are valuable in their heat effect; visible radiation is of doubtful value. Ultraviolet rays are useful in treating excoriations and necrosis of epithelial tissues. Blepharitis marginalis, certain types of pseudoblepharitis, ulcers of the conjunctiva following chemical burns, trachoma, vernal catarrh, and corneal ulcers are helped by ultraviolet therapy. Before treatment all débris, mucus, and crustations should be removed.

*Discussion.* Dr. Harry Gradle said that we should not let the statement pass that ultraviolet is good for all erosive processes of the epithelial surface. Long experience has shown that the field for ultraviolet therapy is extremely limited. There is only a very small range wherein it is possible to use it with safety; below 3,200 angstrom units the rays are extremely toxic and above 3,600 angstrom units they are of little value; therefore there is but a small range of about 400 units that can be used. These rays require intensive filtration. According to the reports of clinics where they have been used on large series of patients over long periods, the concensus of opinion seems to be that they are of value only in herpetic diseases of the cornea. In other diseases of the anterior part of the eye, ultraviolet is inferior to other forms of treatment at our command. Furthermore, in any disease involving the deeper structures of the eye it is entirely without value.

### Radium therapy

Dr. R. James Larkin said that one of the most common eye conditions requiring radium therapy is basal-cell epithelioma of the lid. Squamous-cell carcinoma is less common. In addition to neoplasms, vernal catarrh, keloids, and inflammations are treated successfully by radium. One cause of failure in the treatment of vernal catarrh is the lack of equal intensity of irradiation to all parts of the conjunctiva.

*Discussion.* Dr. Thomas D. Allen recalled a case which Dr. Wilder had presented on a number of occasions, melanocarcinoma of the conjunctiva in a woman 30 years of age. She had had a nevus of the limbus which extended until it reached the fornix above and the conjunctiva of the eyelid below. Professor Fuchs had recommended evisceration of the orbit, which was refused, and under Dr. Wilder's supervision radium treatment was given by two ra-

dium specialists, one of whom gave many small doses over a period of about 18 months. The lesion became smaller and less pigmented. Later it increased in size and seemed to become radium resistant. She again refused evisceration, and was again treated with radium, this time six or eight heavy doses of radium. The lesion completely disappeared 12 years ago, all pigmentation disappearing, and when she was seen recently there was no scarring, no pigment, no lesion of the lens, and no cataract.

Dr. J. E. Lebensohn said that radiologists tend to minimize the dangers of irradiation cataract, but recent contributions have demonstrated that their optimistic views are unwarranted. It has been definitely shown that the lens is the most sensitive of the ocular tissues to radiant energy. In man cataract does not develop until two to 12 years after radium or X-ray treatment; in rabbits, a single exposure of 1,000 roentgens will produce a cataract in five to six months. This long latent period is characteristic, and because of it the radiologist has been lulled into a false sense of security.

In a review of the literature in 1932 he had found over 50 cases. Since then 22 additional cases of irradiation cataract have been placed on record; of these, 12 were reported by Milner in 1934 from St. Bartholomew's Hospital. His own case concerned a girl who, at the age of 18 years, was treated for acne by X rays. Five years later she developed bilateral cataracts. Young persons seem particularly susceptible; in children cataracts have been traced to a single erythema or depilatory dose.

Dr. Sanford Gifford in reply to Dr. Larkin's question about the appearance of the irradiation cataract, said that it can be distinguished from most types of cataract if it is seen early. It begins near the posterior pole of the lens and increases in opacity very slowly and is only to be confused with cataracta complicata and posterior cortical cataract in older people. When mature it cannot be distinguished from any other type. As to the latent period in which cataract occurs, some work has been reviewed by Rohrschneider in Germany, and by Hold, Stoll, and de Vries, who examined all the patients given radium at Utrecht. They found quite a number of cases in which radium had been given for epithelioma around the lids. There seems to be considerable variation of individual sensitivity, and much variation in technique. The filtration should be done where the cornea can be protected. Radium should not be advised where vernal conjunctivitis is not of severe type. Dr. Larkin's success is probably due to his careful technique. In one case of tumor of the lid submitted to him, he said that radium would make a hole in the lid and that it would be better to remove the tumor by surgery.

### Roentgen therapy

Dr. James T. Case said that roentgen rays and radium have precisely the same biological effect, the effect differing only when radiation of different wave lengths are employed. With the X rays we are able to vary the penetration by altering the voltage and by changing the thickness of the filter; thus we may use a radiation that is very soft, medium hard, or hard, at will.

Grenz rays are border-line X rays of a wave length just a little longer than the softest X rays employed for diagnostic purposes. At one time very long rays were employed, bordering on Grenz rays, using a Lindemann glass-window X-ray tube which gave out ra-

diation of long waves entirely comparable to the Grenz (border) rays of today. However, these tubes did not have a long life and they required very precise application and very careful measurement of the dosage.

In some lesions of the eye there is one very great advantage obtained by the use of radium which cannot be obtained with the X ray; namely, the possibility of placing the source of the radiation close to the lesion. While it exercises a potent effect upon the skin and the conjunctiva, parts of the eye near the lens receive so much smaller a dose that there is not much danger of damaging the lenticular structure.

Very intensive irradiation of eight to ten erythema doses at one sitting requires very careful protection of all parts of the skin except that which bears the lesion. If this kind of treatmeant is decided upon, it is feasible to protect the lens sufficiently to minimize the damage if not entirely to avert it. Such precautions can also be employed when radium is used.

Inflammatory lesions lend themselves particularly well to X ray rather than to radium therapy; chiefly, perhaps, from the standpoint of convenience and economy. The best results in inflammatory conditions are obtained with doses of about 20 percent of the skin erythema dose. Such a treatment repeated at intervals of five to seven days may be continued until a total of 100 to 200 percent of the skin erythema doses has been applied. In acute conjunctivitis and other inflammatory conditions which resist other methods of treatment, the employment of the X rays produces a very definite and prompt amelioration in the inflammatory process. It is especially valuable in the treatment of erysipelas and other streptococcal infections. Tuberculous lesions about the eye also respond very well to radiation. Some other lesions which have given satisfactory results under roentgen treatment are keratitis ulcerosa, keratitis parenchymatosa, uveitis, trachoma, and pannus trachomatosus. Recurrences are not numerous and they respond readily to further irradiation.

Robert von der Heydt.

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## CONGENITAL SYPHILIS OF THE SECOND GENERATION

"I the Lord thy God am a jealous God, visiting the iniquity of the fathers upon the children unto the third and fourth generations. . . ."

Like many other Biblical texts, this from the Ten Commandments according to the King James version has received many applications more or less foreign to its original purpose. It has not failed to serve in discussions of syphilis, perhaps the most devastating of human plagues because in so many ways its results are carried over to later generations.

To the effect of syphilis upon the germ plasm it is plausible to attribute almost any manifestation of familial degeneracy, although the evidence in support of such claims is sometimes flimsy and unconvincing. In varying degree it is possible to associate with almost any neglect of the laws of health, in those who later assume the responsibility of parenthood, a deleterious influence upon later generations. But probably the greatest offenders in this regard are alcoholism, tuberculosis, and syphilis.

A fairly considerable literature has been devoted to discussion of the alleged occurrence of parenchymatous keratitis as a manifestation of congenital lues of the second generation. Most of the reported cases are vulnerable to careful criticism. In the majority of patients it is difficult to prove congenital lues of the

second generation, although its presence may often be argued with much plausibility. Some writers have absolutely denied its existence, but in a few cases the positive evidence seems to be altogether beyond question.

Fournier, Finger, and others have demanded that the following six conditions shall be fulfilled before a case is accepted as one of congenital syphilis of the second generation: (1) Lues must be definitely proved in the grandchild. (2) Acquired syphilis must be positively excluded in this individual. (3) One parent must be definitely afflicted with congenital lues. (4) Here again it must be possible to exclude the acquired disease. (5) Acquired syphilis must also be excluded in the parent who is free from congenital syphilis. (6) Syphilitic disease must be demonstrable in the grandparents on the congenitally affected side, or at least in the mother of the patient.

It has also been urged that the congenital disease should have manifested itself shortly after birth, since the cases of late congenital lues are much too unreliable. But in this connection it may be remarked that on the whole those important stigmata of congenital syphilis which were recognized in the pre-Wassermann era—especially the signs of specific processes which have run their course, such as rhagades, saddle nose, scars of parenchymatous keratitis, pepper-and-salt fundus, and the Hutchinson triad—have retained their significance in the light of the blood examination.

Haldimann (Zeitschrift für Augenheilkunde, 1936, volume 90, page 146), in presenting two new cases of parenchymatous keratitis in congenital lues of the second generation, insists upon the necessity for an even more restricted statement of the third of the six conditions mentioned above. According to him, it is not sufficient that simply one parent shall have suffered definitely from congenital lues, but it is necessary that only the mother shall have been so afflicted; for it is only possible to exclude the acquired disease in the mother with reasonable certainty if the father was not affected by syphilis.

With regard to condition number six, Haldimann points out that frequently the grandparents have died before the investigation of the grandchild is undertaken; yet he is not disposed to attach very great significance to this gap in the evidence, provided that congenital lues in the mother of the patient can be conclusively argued from symptoms and history, such as of premature births in the grandmother. The most positive sign of congenital lues is probably parenchymatous keratitis.

It must not be forgotten that, while the Wassermann reaction is positive in a large proportion of untreated cases of manifest lues in the nursing infant, the reaction tends to become weaker and even to disappear in the course of time, even in the absence of treatment; so that in the investigation of possible cases of congenital syphilis of the second generation it may be necessary to rely largely upon corneal, choroidal, or bone stigmata.

Haldimann tabulates twelve cases which he has assembled from the literature, emphasizing the doubtful features in five of them.

Haldimann's own two patients were women of twenty-one and thirty-four years respectively, both suffering from severe parenchymatous keratitis. In the first case the Wassermann reaction was suspicious, in the second case it was definitely positive. The former patient had no sign of other luetic disease, the latter had joint disturbances which may or may not have been syphilitic.

The mother of the first patient had a

suspicious blood-Wassermann reaction and gave a history of one abortion, but had no further signs of lues. There was definite evidence of syphilis in the grandmother before the birth of the patient (a still birth and parenchymatous keratitis in an older sister of the mother, as well as the death in infancy of four younger children of the grandmother). The father of the patient was entirely normal, and so were the other members of the father's family, and his blood-Wassermann reaction was completely negative.

The mother of Haldimann's second patient also showed a suspicious Wassermann reaction, and she had gone through a parenchymatous keratitis. Her older brother had been a cripple since childhood, had no hearing, and had defective vision and speech. A dead younger sister had had several abortions but also five living children. The grandmother on the mother's side had had a valvular cardiac defect and had died of a heart attack at forty-five years. The patient's father was healthy and had a completely negative blood-Wassermann reaction.

Kraus (quoted by Haldimann) has attempted to show that congenital syphilis of the second generation has special characteristics which set its symptomatology apart from that of congenital syphilis of the first generation. But the seven cases which Haldimann tabulates from the literature as proved with reasonable certainty include five cases of parenchymatous keratitis, one of chorioretinitis, and one of the Argyll Robertson phenomenon; that is to say, no change which is not also found in congenital lues of the first generation. Furthermore, the cases found in the general literature of syphilis furnish no evidence in support of Kraus's contention.

W. H. Crisp.

## THE GLIMMER RACKET

The credulity and trustfulness of humanity passes understanding. A recent illustration of this is the success of a nation-wide organization of crooks who have posed as eye specialists. The Journal of the American Medical Association has called attention to this "eye swindling racket" in several of its recent issues (Novemer 14, page 1643; December 19, page 2059; January 2, page 55) and the United States Post Office Department has issued a special article on the subject.

The enormous prices paid by country dwellers to itinerant spectacle venders for inferior glasses prescribed by rule of thumb have long been a matter of knowledge, but this latest play on the rural dweller's gullibility may not have come to the attention of all of our readers and should be widely known. In their caution to avoid publicity, physicians frequently err by failing to keep the public as well informed as possible on medical subjects. Newspapers and popular magazines have presented distorted descriptions of telescopic lenses, contact glasses, operations for retinal detachment, and even intracapsular extraction of cataract. It would be well to disseminate the truth in these and other matters of ophthalmic interest as widely as possible for the broader usefulness to the public of facts concerning the eye, and at the same time to protect it from fakers.

The Government release states that this latest scheme to defraud the unsuspecting was made up of more than a hundred operators and was nation wide. Automobiles were used in transporting the impostors rapidly from one state to another. They stayed only a short time in each state. The racket is carried out somewhat as follows, as quoted from the Journal of the Missouri State Medical Association of December, 1936, page 458:

"In the Glimmer Racket there are per-

sons known as 'finger men' who travel about the country selling eye glasses. Some of them are licensed opticians. They sell very cheap glasses for exorbitant prices. Sometimes they sell glasses worth not over $5 for more than $100.

"The fake doctor who first goes into the house introduces himself under the name of some nationally or internationally known physician, surgeon or oculist, and claims to be connected with some well-known optical house.

"The fake doctor gets out his kit and instruments. He fits lens after lens into the testing frame and pretends that no satisfactory results are obtained. He appears to be worried over the case, and from much practice he acts the part well. He finally tells the victim he cannot make a fitting as something is unusually wrong with one eye. He informs the victim that he has an eminent eye specialist with him in his car and suggests that he be called in to make an examination.

"The alleged eye specialist is called in from the doorway and told to bring his kit containing his instruments. They let the victim see clearly that there is no collusion between the two. The 'doctor' is dressed to play the part of a successful professional man from the big city or famous institution. The first man tells the fake doctor his troubles; how the whole matter has baffled him and asks if he will make an examination without charge. This he agrees to do.

"The fake doctor then makes his examination. He says little or nothing. He shakes his head as the examination progresses indicating the discovery of some serious trouble. He finally announces, 'It is no wonder you cannot fit glasses to this eye. It is in a very bad condition. There is a "cancerette" on it. Unless it is removed very shortly it will either go to the brain and result in death or paralysis will follow. There are only a few hospitals in the country where such cases can be safely and successfully operated on.' "

After further discussion as to costs at such institutions, the fake specialist is induced to undertake the operation, stipulating absolute secrecy. The article continues:

"The fake doctor has the patient lean back. The head dropped farther backward. An eye-dropper is inserted into a green opaque glass bottle, heavily corked, and a very few drops of the precious liquid, represented to be radium but actually some patent eye liquid, are withdrawn. After these drops are put into the eye, a blunt pair of medicated cotton-tipped medical tweezers are used to rub the medicine around in the eye as an occasional drop is added. The fake doctor will request the mate of the victim, if present, to procure some hot water.

"During the few intervening moments of absence, this faker will remove from his mouth a piece of rubberoid material which he had placed therein at the time he ostensibly went to the car for the 'leaflet' and spreads it over the patient's eye. He continues to stimulate the rubbing of the eye with the tweezers, and after this tissue rubber has been spread over the entire eye to the fake doctor's satisfaction, he will call any one present and point to the wonderful effect of his so-called 'liquid radium' in drawing this cancerous growth to the surface, explaining it is coming out by its roots. Very shortly, he utilizes the tweezers to catch hold of the rubber, which is then slowly withdrawn from the eye.

"This so-called cancerous growth is immediately thrown into a fire, or in some other manner destroyed by burning. If the credulous folks desire either to preserve it or inspect it closely, they are impressively told: 'This is a most virulent poison. It is so deadly that it must be destroyed by burning. If I were to throw

it into the yard and one of your chickens ate it, it would not injure or kill the chicken any more than the other filth chickens eat, but if you should later kill that particular hen, then all who ate of it would get cancer of the stomach.'

"If the swindlers are successful in obtaining a large amount of money for the pretended operation another visit is made to the victim in about two weeks by two different members of the ring, one claiming to be a noted eye specialist and the other a judge. These men represent that the 'specialist' who performed the operation was killed in an accident, but lived long enough to make the request that an examination be made to determine whether the operation had been successful, and directed that the money paid for the operation be returned if it was not a success. The pretended judge falsely represents that he is selling the estate of the deceased doctor, and that he stands ready to make the refund if the operation failed.

"An examination is then made on the pretense of determining whether the operation was successful, following which the new fake doctor announces: 'I find that you have "cancerosis" of the eye in the very worst form, and unless something is done at once you will be paralyzed and probably lose your life. But you can be cured. A renowned German physician named Krupp invented a belt which if worn will cure it. The belt gives off radium rays and is a sure cure, as it corrects the condition of the blood.'

"The victim is told there are only a small number of these belts in existence as Dr. Krupp died without leaving the formula. It is claimed that the belts are in the possession of a few renowned hospitals and that the 'doctor's' own hospital is one of them. A child related to the 'judge' is at present wearing the belt but as the child is practically cured of infantile paralysis, the belt will be available in a short time. The victim is told that he can rent the belt for a dollar a day but because of its great value, he must post a deposit for its safe return. It is understood that there will be no charge for the belt if it does not effect a cure and that the deposit will be given back when the belt is returned.

"In this way victims are induced to give the fake eye specialists large amounts in the form of checks or cash as security, in the belief that the deposit will be held until the return of the belt; but the fakers cash the checks as quickly as possible and seldom deliver the belts."

Post office inspectors sent out circulars describing the plan of operation of these fake eye specialists and as a result of this circularization fifteen of them have been arrested. Two have already been convicted, one being sentenced to twenty-five years imprisonment and one to five years. Others are in jail waiting trial or are out on bond. The article continues:

"But this does not account for all of the swindlers. There are many in the Glimmer Racket, and they may show up anywhere at any time for they operate from coast to coast.

"It is especially desired to have this information brought to the attention of the aged and all those afflicted with eye ailments. The Department is confident of the active assistance of all decent citizens. Such assistance can best be rendered by bringing any and all known complaints promptly to the attention of your local peace officers and your postmaster."

The story of this fake deserves wide publicity. Local newspapers may be sufficiently interested to publish it and thus help put people on their guard. Even if they never encounter this particular confidence game it may serve to make them a little more cautious as to whom they will entrust the examination of their eyes.

Lawrence T. Post.

## BOOK NOTICES

PSYCHOLOGICAL MONOGRAPHS. Edited by JOHN F. DASHIELL. Dodge Commemorative number. Published for the American Psychological Association by Psychological Review Company, Princeton, N.J. Paper covered, 415 pages. Price $4.50.

This collection of papers contains a group of experimental studies on psychological functions that will be valuable to those who are interested in the physiology of sight. To those interested only in the clinical application of experimental work we would not recommend these researches. A vast amount of extremely exacting work is represented by these papers. Their technical nature prohibits abstracting in this Journal. A list of the subjects is given here so that any of our readers who are particularly interested may consult the original monographs. In addition to a prefatory section in appreciation of Professor Raymond Dodge there are a half-dozen papers each in a section entitled "Experimental studies on children" and one entitled "Experimental studies on adults." The section dealing with "Experimental studies on visual functions" contains the following papers: Ernest R. Hilgard and Donald G. Marquis: Conditioned eyelid responses in monkeys, with a comparison of dog, monkey, and man. Sidney M. Newhall: An instrument for color stimulation and measurement. Carleton F. Scofield: The effects of mild doses of alcohol and caffeine on optic nystagmus. Roland C. Travis: The latency and velocity of the eye in saccadic movements. James Carles Fox, Jr., and Frank Hallock Couch: Spontaneous nystagmus—a study in neural rivalry and competition. Walter R. Miles: The reaction time of the eye. O. H. Mowrer: A comparison of the reaction mechanism mediating optokinetic nystagmus in human beings and in pigeons. Robert T. Ross: A comparison of the regional gradients of fusion frequency and visual acuity. G. R. Wendt: The form of the vestibular eye-movement response in man.

A further section deals with "Historical and theoretical studies," and there is a good index. Lawrence T. Post.

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PROCEEDINGS, NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS. 1935, Annual Conference. Octavo, 173 pages. New York. Published by the Society. Price one dollar.

This organization has been largely guided by prominent ophthalmologists, of whom twelve are now on its list of directors, including such men as Alger, Berens, Edgar, Samuels, and John M. Wheeler, of New York, Ellett of Memphis, Lancaster of Boston, the late Holloway of Philadelphia, and Park Lewis, of Buffalo, who is also first Vice-President. The Proceedings include papers by seven ophthalmologists, with others joining in the discussions. Three of the papers deal with glaucoma, and the follow-up and care of glaucoma; two on fire-works accidents, and one on recent advances contributing to restoration and conservation of vision. So much of ophthalmology bears directly on the prevention of blindness, that many of the other papers, bearing on nursing and the responsibility of public and voluntary agencies for the care of patients, will help the doctor to a broader view of his work. This is a book that should be accessible in any good medical library. Edward Jackson.

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## OBITUARIES

### ROBERT HENRY ELLIOT

Elliot, the son of an English Army Officer, was born in the Bombay Presidency, India, in 1864. He was educated

in England; and studied medicine at St. Bartholomew's Hospital. He entered the Indian Medical Service in 1892, and served first on the Northwest Frontier. Then he worked with Sir Thomas Fraser in Edinburgh on the problems of snake venoms. He became an F.R.C.S., England, and from the University of Edinburgh received the degree of Doctor of Science. After attending European ophthalmic clinics, he was appointed Superintendent of the Madras Ophthalmic Hospital. Besides organizing the Hospital, he then began the series of contributions to ophthalmology that soon gave him an international reputation. Col. Henry Smith had begun to publish his enormous experience with the operation of removing cataract in the capsule. Elliot joined with other Indian ophthalmic surgeons in pointing out the limitations and defects of what was being called the "Indian operation for cataract." His first papers, published in the Indian Medical Journal, were followed by others in the Ophthalmoscope, and in the Ophthalmic Review. A paper on "Extirpation of the lacrimal sac" was based on 310 cases. Then came papers on the treatment of glaucoma, and the operation of sclerocorneal trephining, which soon demanded attention in the clinics of the world. His paper on "Effects of couching for cataract" was based on a study of 550 cases. He fully appreciated the great dangers of couching, and worked hard to replace it by the operation for removal of cataract. His books on "The trephine operation for glaucoma," "Couching for cataract," and "Tropical ophthalmology," gained for him an enviable place in the literature of modern ophthalmology.

In 1913 poor health compelled Elliot to leave the tropical climate of India and to remove to London. That year he also visited the United States, and attended the American Academy of Ophthalmology and Oto-Laryngology, and meetings of other American societies. Again in 1922 he visited America. After that he contributed a chapter on glaucoma to the Ophthalmic Year-Book, and in 1923 a notable paper to the American Journal of Ophthalmology upon "The mists and haloes of glaucoma."

After the establishment of the British Journal of Ophthalmology he became an important contributor to its scientific contents, and, from the time of his return to London, took an active part in the Proceedings of the Ophthalmological Society of the United Kingdom. In his literary work Elliot always had the support and assistance of his wife. In each of his books, after the title-page comes a page bearing the inscription to E.C.I.E., and in his "Tropical ophthalmology" are added the words "but for whose unswerving help the book would never have been written." In 1916 they presented, as of joint authorship, to the Section of Ophthalmology of the Royal Society of Medicine, their method of photographing macroscopic and microscopic eye specimens. Most of Elliot's books, although based upon his experiences while at Madras, were published after he went to London. The death of his wife twelve years ago, was a blow to him from which those near to him felt he never fully recovered.

After Elliot settled in London he was appointed ophthalmic surgeon to the Hospital for Tropical Diseases, and lecturer in the London School of Hygiene. He was also a founder and chairman of the British Health Resorts Association, which was formed after he had written a letter to the "Times," after Lord Snowden had called attention to the great amount spent by the English tourists each year at the health and pleasure resorts abroad. Elliot continued his active life, as he wished to do, in spite

of poor health, until a short time before his death on November 9, 1936. Those who met Col. Elliot, during his visits to America, felt he was more nearly American than most British doctors who have come here. This was due to his cosmopolitan life, his ready understanding, broad sympathy, and devotion to new and general interests. Edward Jackson.

## GAETANO LODATO

Gaetano Lodato died suddenly on October 18, 1936. Soon after his graduation from the School of Medicine of the University of Palermo, in 1893, he was appointed assistant to the Eye Clinic of the same university, which at that time was directed by Arnaldo Angelucci, and collaborated with the great master until 1906, when he was given the chair of ophthalmology of the University of Siena. In 1909 his life dream was realized with his appointment as professor of ophthalmology at his alma mater.

During his long professional career he held many important positions both in the social and scientific field, being a member of the National Council of Researches; vice-president of the Royal Academy of Sciences, Letters and Arts of Palermo; corresponding member of the Mexican Ophthalmological Society, and others; co-director of the Bollettino d'Oculistica, of the Rassegna Italiana di Oftalmologia, of the Rivista Oto-Neuro-Oftalmologica, and for many years a chief of the editorial staff of the Archivio di Ottalmologia. Among his scientific publications, which amount to more than seventy, can be mentioned a group of works on anatomy, physiology, and experimental physio-pathology of the neuro-epithelial layer of the retina; on physical and chemical changes of the retina; on the associated pathways of the two retinas, and chemical reaction of the nervous centers under the influence of the retinal function; his researches on the superior cervical ganglion in reference to the ocular physio-pathology, and numerous others on the embryology and bacteriology of the eye. Lodato's syndrome is the associate keratoconus and spring catarrh symptomatology. His death is a great loss to Italian ophthalmology, to his community, and to friends.

Melchiore Lombardo.

## CORRESPONDENCE

November 23, 1936.

CONGENITAL OCCLUSION OF THE LACRIMAL DUCT (SEE THIS JOURNAL, 1936, VOLUME 19, PAGE 1009).

It is not my practice to enter the duct with the largest probe *available*. I do enter the duct with the largest probe I can pass through the punctum without doing any damage to it, because I believe that you are not so liable to make a false route with a large probe as you are when you use a thin one. If an abscess of the tearsac is present, which does not respond to conservative treatment, I do incise it and cauterize it with trichloracetic acid, a method introduced by H. Gifford.

(Signed)

George P. Landegger, M.D.

# ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

## CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, history
19. Anatomy, embryology, and comparative ophthalmology

## 1

## GENERAL METHODS OF DIAGNOSIS

Cowan, Alfred. **A one-meter perimeter.** Amer. Jour. Ophth., 1936, v. 19, Nov., pp. 1005-1006.

Evans, J. N. **Fixation in scotometry.** Arch. of Ophth., 1936, v. 16, July, pp. 106-118.

This review includes discussion of macular function, the influence of accommodation on fixation, and the musculodynamics of fixation.

J. Hewitt Judd.

Foroni, C. **Ophthalmotonoangioscopy in early diagnosis of optic neuritis and of incipient optic atrophy.** Graefe's Arch., 1936, v. 136, p. 100.

For study of the blood vessels on the optic disc the author recommends slight and gradually increasing pressure on the eyeball with the convex handle of one-half a disjointed pair of scissors, examining by the erect method. While observation is made with the ophthalmoscope, pressure upon the eyeball is made from behind forward until the small vessels disappear and the larger ones empty, although one must be sure that the central artery still pulsates. After several seconds, the pressure is suddenly released while the observer continues to study the disc. When a latent inflammatory process exists, the disc, which was previously very pale, becomes very congested and swollen by appearance of numerous previously invisible capillaries which obscure the papillary margins, and by pronounced ectasia of the central vessels, particularly the veins. After several seconds (frequently after a minute) the normal picture gradually returns. When on the other hand no optic neuritis exists, the blood vessels present only the aspect of simple and transient congestion or hyperemia of the disc, which continues for ten or twenty seconds. In cases of incipient optic atrophy, the reaction in the blood vessels of the disc is very slight or very transient, never lasting longer than ten seconds.

H. D. Lamb.

Gerber, A., and Lambert, R. K. **Blue appearance of the fundus caused by prolonged ingestion of methylthionine chloride.** Arch. of Ophth., 1936, v. 16, Sept., pp. 443-446.

In three cases prolonged ingestion of methylene blue resulted in greenish-blue coloration of the fundi. In one case a patch of myelinated nerve fibers did not appear blue. The presence of the dye does not alter the visual acuity or color vision. It is thought that the coloration is due to presence of the dye in the vitreous. (Colored plate.)

J. Hewitt Judd.

Heinrich, Adolf. **A little-known pupillary phenomenon during general anesthesia.** Klin. Woch., 1936, v. 15, July 11, p. 1010.

Before the stage of reflex pupillary paralysis under bilateral illumination in the course of a general anesthesia, especially ether anesthesia, there is a short period during which reaction of the pupils to light is already abolished if the illumination is unilateral, but is still present on bilateral illumination. This period indicates the optimum depth of anesthesia. The author assumes a summation of impulses in the region of the Westphal-Edinger nucleus, whose responsiveness decreases during narcosis. On unilateral illumination the impulse is too weak for the threshold of response by the nucleus.

Bertha Klien.

Herrmann, R., and Kiewe, P. **Experimental research on ocular infection by the colon bacillus in the guinea pig and rabbit.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 461-472.

Except by direct inoculation of the vitreous, it is not possible to infect the eyes of rabbits and guinea pigs with the colon bacillus unless the animal is previously sensitized by subcutaneous injection of the bacilli. Following sensitization infection by way of the cornea results in fulminating panophthalmitis. (Illustrated.) P. J. Leinfelder.

Kleefeld, G. **Objective examination of the eye by means of monochromatic yellow light (sodium lamps).** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 24.

The ideal monochromatic yellow would be from a light having a wave length corresponding to that of sodium (5890-5896 Angström). The sodium vapor lamp is the most practical for clinical use. The striking peculiarity of sodium light is that although it causes radical modification of the color of objects it seems to render the eye much more sensitive to other light radiations. The author describes at some length the industrial lamp of Phillips and the Osram-Zeiss lamp. He concludes that this type of illumination constitutes a valuable aid to the study of ocular vessels, opacities, and hemorrhages. Light sources should be more monochromatic than those used at present, and to that end the filters need to be as little absorbent as possible for yellow radiations. In discussion the pertinent question was asked whether research had been made concerning possible danger to the eye of the subject and of the examiner. No answer appears in the text.

Jerome B. Thomas.

Knobloch, Rudolph. **Estimate of visual acuity in opacities of the optic media, by means of fundus photography.** Ceskoslovenska Oft., 1935, v. 2, no. 3, pp. 174-179.

The author advocates fundus photography as a new method of estimating the acuteness of vision when there are opacities of the optic media. He compares these with normal fundi. Thus without reference to the patients' statements he can estimate their minimal vision. (Illustrated.)

G. D. Theobald.

Kukán, Franz. **Results of blood-pressure measurements with a new ophthalmodynamometer.** Zeit. f. Augenh., 1936, v. 90, Oct., p. 166.

To measure blood pressure in intraocular vessels, one brings about an increase in intraocular tension to a point at which a certain vascular phenomenon is observed with the ophthalmoscope. Instead of using pressure on the eyeball to raise the tension, as other experimenters have done, Kukán applies a cup connected with a 50-c.c. syringe and a vacuum manometer. By pulling the plunger of the syringe, the tension can be raised rapidly and at any moment an assistant can read the manometer. The method has the advantage that it can be used in any position, causes no pain except when taking cystolic arterial pressure, and can be done so quickly that congestion of orbital vessels does not take place. Observation is easy because the eye is not pressed into the orbit as in other methods, but is actually held by the vacuum cup. To determine what the intraocular pressure actually was when the desired vascular

phenomenon was noted, one has recourse to one of two methods. One can again apply the vacuum cup in exactly the same situation, raise the pressure to the same point on the vacuum manometer, and actually measure the intraocular tension with a tonometer; or one can use a table from which one can reliably get the desired tension if one knows the initial tension and the manometer reading.

F. Herbert Haessler.

Leydhecker, F. K. **Observation of one's own fundus (autoophthalmoscopy).** Graefe's Arch., 1936, v. 136, p. 45.

For viewing the papillary region of the left eye, one sits about 40 cm. in front of a mirror. He holds with the right hand a pocket flash-light or Hammer lamp and looks parallel to the beam of light from the lamp. He is apparently illuminating the right eye, but really the left eye. With the lamp directed properly the pupil is illuminated. Before his left eye the observer holds a twenty or thirty-degree prism between thumb and index finger of the left hand, with the base directed nasally, and between the middle finger and the back of the ring finger of the same hand he holds a convex lens of 13 D. The prism is held about 4.5 cm. from the eye and the lens about 3 cm. before the prism. One can now look through the lens and prism into the pupil and see a direct image of the disc and its surrounding vessels. H. D. Lamb.

Lijo Pavia, J. **Green patch in fundus.** Rev. Oto-Neuro-Oft., 1936, v. 11, June, p. 145, Aug., p. 203, Sept., p. 231.

To study the "green patches" the author is now resorting to infrared ophthalmoscopy and photography and "retrograde chorioretinal transillumination," the latter being a variety of indirect lateral illumination. The method of infrared ophthalmoscopy, to be described in a later communication, has enabled the author to distinguish the "green patches" from pigment masses and choroidal hemorrhages by the diffuseness and irregular thickness of the patches. Infrared photography serves also to establish the choroidal situation of the "green patches" and to differentiate them from pigment and hemorrhages. This is illustrated by comparisons between ordinary and infrared fundus photographs, and also by sketches of fundi seen in indirect lateral illumination by ophthalmoscopy.

M. Davidson.

Lijo Pavia, J. **Green patch in fundus.** Arch. de Oft. de Buenos Aires, 1936, v. 11, July, p. 435; also Rev. Oto-Neuro-Oft., 1936, v. 11, July, p. 173.

Further argument with Damel (see Amer. Jour. Ophth., 1936, v. 19, p. 348).

Lijo Pavia, J. **A new adaptometer.** Arch. de Oft. de Buenos Aires, 1936, v. 11, June, p. 341; also Rev. Oto-Neuro-Oft., 1936, v. 11, May, p. 117.

Apropos of the adaptometer recently described by Nordman, utilizing the French Drem photometer, the author claims priority for having suggested its use in 1930. M. Davidson.

Luedde, W. H. **A transparent exophthalmometer.** Arch. of Ophth., 1936, v. 16, Oct., pp. 681-683; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1936, 87th annual meeting.

A transparent ruler fitted with a zylonite base is placed against the external orbital notch and the readings of the apex of the cornea and the bridge of the nose are made at right angles to the transparent ruler. The reading of the bridge of the nose acts as a check for that of the apex of the cornea. The application of the instrument is shown by photographs. J. Hewitt Judd.

Park, G. E. **An investigation of the angular relation of the visual (visierlinie) and optic (corneal) axes of the eye.** Amer. Jour. Ophth., 1936, v. 19, Nov., pp. 967-974.

Pascal, J. I. **An improved perimeter-campimeter.** Arch. of Ophth., 1936, v. 16, July, pp. 103-105.

This instrument is designed to fill the gap between the simple hand type and the elaborate instruments. The arc of the perimeter is sufficiently broad for

both fixed and moving targets and has a radius of 315 mm. Fixation targets are described which aid fixation and facilitate detection of central scotomata. Perforations at the rim of the arc aid the examiner in seeing the position of the moving target. A flat disc campimeter may be attached. (Photograph.)

J. Hewitt Judd.

Prister, Bruno. **A trap for simulators.** Boll. d'Ocul., 1936, v. 15, July, pp. 777-780.

The writer describes an apparatus based on the effect of sudden change of illumination and use of complementary colors. (Bibliography.)

M. Lombardo.

Rönne, Henning. **The colloidometer.** Klin. M. f. Augenh., 1936, v. 97, Aug., p. 161.

When the light of Gullstrand's slit-lamp penetrates the refracting media of the eyeball it creates in cornea and lens a beam which indicates the path of the rays. If intraocular inflammations increase the albumen in the aqueous both light paths are combined with a weaker one through the anterior chamber. The colloidometer serves to measure the varying albumen content of the aqueous and thereby to judge the course of healing in iritis. The instrument is described and the results of measuring the intensity of the light path in the anterior chamber as a fraction of the amount of the corneal light path are given, with some case records. (Illustrated.) C. Zimmermann.

Skapska, Anna. **Verification of pupillary methods in the diagnosis of pregnancy.** Klinika Oczna, 1936, v. 14, pt. 2, p. 130.

The author subjected 32 pregnant women to the Bercovitz pregnancy test. She concludes that the test is not reliable. Ray K. Daily.

Spinelli, F. **Radiologic researches on crossed symmetric projection of the optic canals in the fixed skull.** Saggi di Oft., 1934-36, v. 8. (See Amer. Jour. Ophth., 1934, v. 17, Oct., p. 973.)

Strandbygaard, B. **Arrangement of the examination room.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 268.

A description of an office, with emphasis on the usefulness and time-saving value of a small light for fixation by the patient during skiascopy.

Ray K. Daily.

Towbin, B. G. **Decoloration of the intravitally stained eye.** Graefe's Archiv., 1936, v. 136, p. 22.

Five albino rabbits from the same litter six weeks old were injected under the abdominal skin three times every other day with one percent trypan-blue solution. Single rabbits were killed respectively 1, 14, 27, 55, and 103 days after completion of the injections; and the eyeballs, eyelids, and retrobulbar tissue were excised. Examination of sections through this material showed from the beginning of the decoloration a diminution in the number of stain-containing cells in the retrobulbar cellular tissue and in the conjunctiva, particularly in the region of the limbus but throughout the eyeball. Although the number of stained cells in the ciliary processes gradually diminished, displacement of stain to the ciliary processes was noted, so that in material removed after 103 days stain was retained only in the ciliary processes.

H. D. Lamb.

Van Heuven, J. A. **Some remarks on edema.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 631-635.

Using the rabbit experimentally the author demonstrates a method which he describes as much more sensitive than those formerly used in following the course of an inflammation. Mustard oil will produce an inflammation virtually always of the same intensity, attended with chemosis. If trypaflavin was injected into one of the veins of the ear of a normal rabbit, no fluorescence of the blood vessels was seen. But after instillation of mustard oil into the conjunctival sac, a vascular meshwork became macroscopically visible under ultraviolet light. (One drawing.)

D. F. Harbridge.

Van Heuven, J. A. **The clinical value of tryptophane reaction.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 635-637.

By experiments with rabbits the author determined that the tryptophane reaction was not a specific test for tuberculosis, but rather demonstrated increased permeability of the capillaries. D. F. Harbridge.

Viallefont and Lafon. **Observation of the finger-nail capillary bed in ophthalmology.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 455-459.

Observations were made on ten cases of detached retina, eight of chronic glaucoma, and seven of optic atrophy. Consistent change in the capillaries was not found, although in three of the glaucoma cases and four of the optic-atrophy cases there was dilatation of the capillary bed. P. J. Leinfelder.

Werner, Sigurd. **The significance of the size of the pupil for fusion frequency in examination with intermittent light.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 28.

Tabulated studies of two series of examinations in light and dark adaptation with dilated and contracted pupils show that the light-adapted eye with an artificially contracted pupil has a lower fusion frequency than a normal eye. The eye with an artificially dilated pupil has a higher fusion frequency than normal. This effect is due to the degree of light adaptation, diminished or increased by the smaller or larger pupil respectively. After forty-five minutes of dark adaptation the difference in fusion frequency practically disappears. This indicates that in clinical application of the flicker method large differences in size of pupil should be taken into consideration. Ray K. Daily.

Zamenhof, Adam. **A simple campimeter.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 450.

A description of the various campimeters and detailed instructions for making one by drawing a series of circles on a blank screen. Ray K. Daily.

Ziering, Jozif. **Pseudoscotomata in myopia.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 441.

Tabulated report is given of the size of the blind spot in fifteen myopes, taken with and without refractive correction. The study shows extensions of the blind spot up and temporally as taken without correction, but disappearing under correction with glasses. To avoid errors campimetric studies on myopes should be made with the refractive error corrected.

Ray K. Daily.

## 2

## THERAPEUTICS AND OPERATIONS

Abramovicz, I. **The general blood pressure and ocular operations.** Klinika Oczna, 1936, v. 14, pt. 2, p. 177.

The objective of the study was to determine the course of the general blood pressure during intraocular operations, the effect of the blood pressure on ocular tension, and the complications emanating from a rise in general blood pressure. The material included 70 cataract cases and 21 glaucoma operations. The blood pressure was taken just before the operation, after the bridle suture, after the iridectomy, and at the end of the operation. The ocular tension of the unoperated eye was taken just before the operation, after the bridle suture, and at the end of the operation. The graphic and detailed report shows greatest variation in systolic blood pressure, which makes its maximum rise at the introduction of the bridle suture through an unanesthetized muscle, and during the iridectomy. There was apparently no relation between general blood pressure and ocular tension. The six complications, all in cataract cases, including three conjunctival hemorrhages, two insignificant vitreous losses, and one vitreous hemorrhage, had no relation to the blood pressure.

Ray K. Daily.

Atkinson, W. S. **Retrobulbar injection of anesthetic within the muscular cone.** Arch. of Ophth., 1936, v. 16, Sept., pp. 494-503; also Trans. Sec. on Ophth.,

Amer. Med. Assoc., 1936, 87th annual meeting.

The author discusses the anatomy of the orbit and the various methods of orbital injection previously described. Cone injection produces complete anesthesia of the globe and paresis of all the rectus muscles except the superior. With the patient looking forward and nasally, a 3.5 cm. needle is introduced through an intradermal wheal located just below the inferior temporal margin of the orbit, and directed upward and inward, midway between the external and inferior rectus muscles, toward the apex of the orbit for a distance of 2.5 to 3.5 cm., depending upon the size of the orbit. From 1 to 2 c.c. of a 2-percent procain hydrochloride solution is injected. J. Hewitt Judd.

Batson, O. V. **Preparation of orbits of cadavers for dissection and operation.** Arch. of Ophth., 1936, v. 16, Oct., pp. 657-658.

The normal contour and tension are restored to the globe by injection of a glycerin jelly and restoration of fluid to the lids is accomplished by injection of a solution of glycerin in water. The materials which are described keep well without the growth of a mold.
J. Hewitt Judd.

Bergler, Karl. **Short-wave therapy for affections of the eye.** Zeit. f. Augenh., 1936, v. 90, Sept., p. 6.

The author reports on the results of about one thousand eye treatments with short-wave therapy in 170 patients in the course of two years. The majority of the eyes had internal inflammations. Glaucoma, fresh retinal detachment, acute purulent conjunctivitis, and tuberculous periphlebitis of the retina were excluded from therapy. The author's experience leads him to believe that not only can short-wave therapy be recommended for some of the inflammatory lesions of the eye because of its cleanliness and simplicity, but it is superior to the usual superficial heaters and diathermy in that it develops heat at greater depth. He has used apparatus with tubes and with spark gap and noted no practical difference. A treatment should not exceed twenty minutes. The most striking results were attained in pyogenic affections such as serpent ulcer, infected perforating wounds, postoperative inflammation, and affections of the deeper corneal strata. Superficial herpetic diseases and tuberculosis of the eye were also helped.
F. Herbert Haessler.

Brecher, J. **A new combined application of dielectrophoresis to the eye for more effective and deeper ion-penetration.** Klin. M. f. Augenh., 1936, v. 97, Sept., p. 399.

Vacuum-iontophoresis is applied by use of a suction-cup electrode. Conduction of the electric current and the action of the ions are increased, and by lymph and blood stasis a too rapid escape of the medicaments is prevented. For deep retrobulbar ionization subconjunctival injection of a salt solution is made as far as possible retrobulbarly, so that a cup electrode filled with iodine or salt at the anterior segment of the globe may act through the posterior wall of the globe. C. Zimmermann.

Fuchs, A. **Some anatomic details of importance in ocular surgery.** Arch. of Ophth., 1936, v. 16, Sept., pp. 341-379.

The importance of Bowman's and Descemet's membrane in intraocular surgery is stressed, with illustrations of the poor results obtained from improperly placed incisions or trephining. The dangers of detachment of Descemet's in cyclodialysis are pointed out. The importance of the angle of the anterior chamber and the variations in the iris are discussed. The surgical importance of variations of the sclera, the zonula, and the vitreous are discussed and special consideration is given to the surgery of iris bombé. The article is illustrated by photomicrographs and contains many valuable observations which can not be included in a short abstract. J. Hewitt Judd.

Grosz, Stephen de. **Roentgen treatment for diseases of the eye.** Arch. of Ophth., 1936, v. 16, Aug., pp. 220-229.

This report is based on observations of eight hundred patients in the University of Budapest. The author describes the equipment and technique used and concludes that blepharitis, rosacea keratitis, and episcleritis are the principal indications. Occasionally it may be used for indolent keratitis, thrombosis of the central vein, and absolute glaucoma. Roentgen therapy is of primary importance in the treatment of tuberculosis, and of secondary importance in treating tumors of the eyeball, as an accessory to radium.

J. Hewitt Judd.

Gutsch, W. **Ultrashort-wave treatment of the eye.** Klin. M. f. Augenh., 1936, v. 97, Sept., p. 386.

Practical experience in treatment of the eye with ultrashort waves showed no results in diseases of the cornea, in scleritis, or in glaucoma, but success in iridocyclitis of any kind, affections of the fundus, tuberculosis, and ocular palsies; in acute purulent processes of lids, lacrimal sac, and orbit; and in supraorbital neuralgia. The tube apparatus with a wave length of six meters and the glass electrodes of Schliephake are useful for ocular treatment.

C. Zimmermann.

Heinsius, E. **Experimental observations as to the influence of vitamin A on regeneration of corneal epithelium.** Graefe's Arch., 1936, v. 136, p. 103.

In different series of experiments, it was demonstrated that either cod-liver oil or vitamin A in the same concentration as that in the oil would accelerate new formation of corneal epithelium, when directly applied to a wound. The favorable influence of the vitamin appeared to vary with its concentration.

H. D. Lamb.

Lenz, Georg. **Local treatment of eye affections with radium emanation.** Klin. M. f. Augenh., 1936, v. 97, Aug., p. 216.

Damaging complications are avoided if in the treatment of eye affections radium is not used in its usual form as a radium salt, but as radium emanation, the nearest stage to disintegration. This occurs in mineral waters, but concentration can be better controlled by an apparatus devised by the author which is described with illustration. In the last three years he has treated three hundred eye patients with solutions of radium emanation in oil and in salves. He concludes that radium emanation is indicated in chronic inflammations of the skin of the lids and in protracted non-purulent inflammatory and degenerative corneal processes, after the acme of inflammation has been passed. Regeneration and clearing are much promoted, irrespective of etiology. Radium emanation is contraindicated in all suppurative infiltrating or ulcerous processes of the cornea and in all affections as long as the eyeball shows intense irritation.

C. Zimmermann.

Lohr, H. **The use of octinum as a mydriatic.** Klin. M. f. Augenh., 1936, v. 97, Aug., p. 255.

In internal medicine octinum serves as an antispasmodic, and it is recommended as an alkaloid-free substitute for atropin and belladonna. It may be used as a mydriatic in cases where brief medium dilatation of the pupil with preservation of accommodation is desired. A ten-percent solution, the effective strength for mydriasis, produces intense hyperemia of the conjunctiva, with lacrimation and burning.

C. Zimmermann.

Minton, Joseph. **Papillomata and other tumors of the lids and their treatment with the electrolysis needle.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 624-626.

The technique for the use of the electrolysis needle for papillomata and other tumors of the lids is described in detail. Advantages are: The whole operation is bloodless. No suturing is required. Recurrence of granulating tissue is prevented. If judiciously used, no scarring will result. The needle is also recommended for cysts of the gland of Moll, for small sebaceous cysts, and for granulomata of the conjunctiva following squint operations or excision of the eyeball.

D. F. Harbridge.

Nugent, O. **Diathermy in diseases of the eye.** Arch. of Physical Therapy, X-ray, radium, 1936, v. 17, Jan., p. 37.

Nugent lists nineteen eye diseases which respond favorably to medical diathermy, and 38 in which surgical diathermy is indicated.

Theodore M. Shapira.

Pexiederova, R. **Results with A-O vaccine.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 250-256.

The author used the A-O vaccine of Arima diagnostically and therapeutically. She finds the Yoshida reaction specific and perhaps more sensitive than the Mantoux, but only in acute tuberculous lesions. In one case the Yoshida reaction was negative and the Mantoux strongly positive. Although some of the 22 cases treated with the vaccine showed improvement, the author was disappointed as to its effect, especially since Japanese authors report brilliant results. G. D. Theobald.

Romano Yalour, R. **Ultraviolet therapy in ophthalmology.** Arch. de Oft. de Buenos Aires, 1936, v. 11, July, p. 423.

Massive ultraviolet irradiation of 300 to 2500 A.U. is considered a valuable therapeutic agent, particularly in corneal affections. M. Davidson.

Wilson, Bryed. **A "parasol" for use in ophthalmic surgery.** Arch. of Ophth., 1936, v. 16, Sept., pp. 504-505.

This device consists of a keystone-shaped welder's lens of number 5 or 6 density, supported by metal stilts on the cheek and brow. It is used to prevent glare in the opposite eye during operation. (Photograph.) J. Hewitt Judd.

## 3

## PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Abramovicz, I. **The role of the vitreous in accommodation.** Klinika Oczna, 1936, v. 14, pt. 2, p. 125.

A study was made on aphakic eyes, to determine the effect of miotics on the depth of the anterior chamber and on the form of the anterior limiting membrane. The author concludes that the vitreous makes a forward movement in accommodation. (Illustrated.)

Ray K. Daily.

Agnello, Francesco. **Further contribution to monocular diplopia.** Riv. Oto-Neuro-Oft., 1936, v. 13, May-June, pp. 266-274.

After removal of the ovaries a woman of 52 years saw two or more images of any object with either eye if the other was closed. Monocularly the image of a candle was seen single at 25 cm., double at 40 cm., triple at 50 cm., and at greater distance a circle of images was seen around the main one. According to the writer the phenomenon was due to excitation of the central nervous system from suppression of ovarian function in a constitutionally predisposed subject, under combined influence of the refractive media and the mechanism of accommodation. (Bibliography.)

M. Lombardo.

Berliner, M. L. **A new type of telescopic lens.** Arch. of Ophth., 1936, v. 16, Oct., pp. 649-654.

A fused telescopic lens is constructed in the form of a small segment inserted in a carrier lens ground to the correction for distant vision. This unit consists of a strong positive and a strong negative flint lens of high refractive index, separated and welded to a crown glass component of low refractive index. The optical principle is explained and shown by diagrams.

J. Hewitt Judd.

Biernacka-Biesiekierska, Jadwiga. **Corneal curvature and ocular refraction.** Klinika Oczna, v. 14, pt. 2, p. 134.

From measurements of refraction, corneal curvature, and radius of 987 eyes the author comes to the following conclusions: The curvature of the optical portion is low in hyperopes. Medium and high myopes show a preponderance of high corneal curvatures. Emmetropes and low myopes show no constancy in corneal curvature: Relative to the size of the cornea the tabulated findings indicate that hyperopes frequently have small corneas, that emmetropes show corneas of all sizes and

that myopes have a preponderance of large corneas. Relative to the form of the cornea the data point to convex corneas in medium and high hyperopes, flat corneas in myopes, and equal numbers of all forms in emmetropes.

Ray K. Daily.

Bunge, E. **Total color-blindness, hemeralopia, tapetoretinal degeneration in two sisters.** Klin. M. f. Augenh., 1936, v. 97, Aug., p. 243.

Two sisters, in whose paternal antecedents myopia, albinism, and nystagmus had occurred, showed congenital total color-blindness, apparently due to heredity. One had peripheral tapetoretinal degeneration, the other a degeneration of the macula which may also have been merely a partial phenomenon of total color-blindness. With identical functional deficiency, a marked difference existed in the ophthalmoscopic pictures, which had in common only a striking lack of pigment, especially at the periphery.

C. Zimmermann.

Creak, M. **Reading difficulties in children.** Arch. of Dis. in Childhood, 1936, v. 11, June, p. 143.

Creak's comprehensive study of reading difficulties in children was undertaken in an attempt to explain these difficulties and to see if they were related to other forms of congenital and acquired aphasia.

Theodore M. Shapira.

Ehlers, Holger. **The ocular movements during reading.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 56.

The author demonstrates that with a little experience eye movements during reading may be counted, or may be auscultated with a stethoscope over the closed eye while the reading is done with the other eye. The eye movements may also be calculated by dividing the length of the line by the length of that part of the line which can be seen at one glance, without moving the eye.

Ray K. Daily.

Gala, A. **Case of congenital monocular refraction diplopia.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 243-245.

A 21-year-old lawyer developed diplopia in the right eye from fatigue and extreme use of his eyes in poor light. Vision was normal, and skiascopy showed the eye emmetropic. There was hyperopic astigmatism of the cornea, 3.5 D., compensated by curvature of the lens, the anterior surface of which appeared much flatter than in the left eye. The diploplia was first noticed when "sighting" a rifle. It was not constant.

G. D. Theobald.

Gertz, Hans. **The aberration of fixation and its relation to retinal correspondence.** Acta Ophth., 1935, v. 13, pts. 3-4, p. 192.

A detailed review of the literature and a description of the author's tests to determine the extent of the ocular movements during fixation and the effect of these movements on retinal correspondence. The study shows that during initial fixation the extent of the movements is between 4 and 5 millimeters. They widen during continued fixation, and this fixation instability has wide individual variations. The author found a monocular movement which he designates as the interocular aberration, and which he believes proves the presence of disparate areas of retinal correspondence. Ray K. Daily.

Granit, Ragnar. **State of adaptation and flicker in the electrical responses of two types of retinae.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 21.

The author suggests that the fusion frequency of intermittent visual stimuli be substituted for the threshold of light perception as an indicator of disturbances in adaptation. The threshold of light perception tests the rod vision of the retina, that is the increase in sensitivity following regeneration of visual purple. The fusion frequency to a flickered light shows how the eye reacts in light and dark adaptation.

Ray K. Daily.

Heinonen, Oskar. **Etiology of high unilateral myopia and astigmatism.** Acta Ophth., 1935, v. 13, pts. 3-4, p. 240.

Mathematical study of 170 cases indicates occurrence of non-hereditary unilateral myopia. Ray K. Daily.

Johnson, G. L. **Subjective visual sensations**. Arch. of Ophth., 1936, v. 16, July, pp. 1-4.

The author describes his personal sensations during periodic attacks of bilateral fortification spectra not accompanied by migraine or sick headache and attributed to chiasmal disturbance from anemia or atonic dyspepsia. The C-shaped images were identical as regards size, position, and shape, and vibrated rapidly centrifugally. There was contraction of the area of critical vision during the attack. (Drawings.)

J. Hewitt Judd.

Karbowski, Mieczyslaw. **Phenomenology of color vision. 1. Contrast and irradiation.** Graefe's Archiv, 1936, v. 136, p. 1. (See Amer. Jour. Ophth., 1935, v. 18, Oct., p. 979.)

Kravkov, S. V. **The effect of auditory stimuli on the fusion frequency of intermittent light.** Acta Ophth., 1936, v. 13, pts. 3-4, p. 260.

A detailed description and graphic data of a study of nine persons during a thirty-minute period of dark adaptation. The findings show a difference in the effect of sound on central and peripheral vision. During the period of auditory stimulation the fusion frequency is increased for central vision and lowered for peripheral vision. The suspension of auditory excitation in peripheral vision is followed by a period of increased fusion frequency above normal. During periods of prolonged auditory excitation the effect reaches a maximum and diminishes. The effect on central vision is explained by the reinforcing effect of the auditory stimuli on the optic pathway. The inhibitory effect of sound on peripheral vision is explained by functional inhibition of the rod under the influence of simultaneous cone excitation.

Ray. K. Daily.

Lipschutz, Hermann. **Myopia and orbital congestion.** Arch. of Ophth., 1936, v. 16, Aug., pp. 255-256.

The author discusses Levinsohn's theory that gravity is a causative factor in myopia and presents data to contradict this assertion. J. Hewitt Judd.

Litinskii, G. A. **The acuity of color perception on the Nagel anomaloscope in relation to the dominant eye.** Sovietskii Viestnik Opht., 1936, v. 9, pt. 1, p. 29.

A tabulated report of fifty normal trichromates tested on the Nagel anomaloscope shows that the dominant eye has a greater acuity of color perception as well as a keener ability to differentiate the various nuances of color.

Ray K. Daily.

Melanowski, W. H. **Color perception and its defects.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 319.

A complete discussion of the subject, prepared for graduate students. The author cites the case of a young man with a central scotoma, nystagmus, contracted fields, and color blindness to support Kries's claim that colors are perceived by the cones of the retina.

Ray K. Daily.

Moretti, Egisto. **Rare familial high hyperopia.** Reprint from Bollettino della Soc. medico-chirurgica di Catania, 1936, v. 4, no. 8, pp. 452-457.

Two sisters, whose mother had microphthalmos, showed respectively 21 and 17 diopters of hyperopia. In the former case an eye had to be enucleated on account of absolute glaucoma. It had an almost spherical shape, measuring 18 mm. through the equator and 17.7 mm. anteroposteriorly. W. H. Crisp.

Motolese, A., and Berardi, M. **Corneal astigmatism and heredity.** Graefe's Arch., 1936, v. 136, p. 27.

Study of corneal astigmatism among members of fifty families showed occurrence of this condition in all the descendants whenever one parent was affected. The number of generations observed was however too few to conclude that inheritance of corneal astigmatism occurs in a dominant manner.

H. D. Lamb.

Puglisi-Duranti, Giovanni. **Clinical contribution to the knowledge of internal ophthalmoplegia.** Saggi di Oft., 1934-36, v. 8. (See Amer. Jour. Ophth., 1935, v. 18, Dec., p. 1161.)

Rönne, Henning. **Clinical testing of school children's reading abilities.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 39.

The author's tabulated studies show that the intelligence age of the majority of good readers is close to their chronologic age and that the intelligence age and reading ability of the majority of bad readers are behind their chronologic age. Bad readers whose intelligence age is above their chronologic age the author considers word-blind.

Ray K. Daily.

Streiff, J. **The significance of entoptic and hallucinatory phenomena in pathologic intraocular conditions.** Klin. M. f. Augenh., 1936, v. 37, Aug., p. 229.

Five cases are reported with descriptions of entoptic and hallucinatory sensations by the patients after operations for retinal detachment, choroiditis, and glaucoma. The sensations were caused by intraocular irritation.

C. Zimmermann.

Strömberg, E. **Refraction and axial length of the human eye.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 281.

A mathematic and graphic study of 5,721 eyes. Ray K. Daily.

Sugita, Yozo. **Crystallogic studies with the use of roentgen interference and other methods.** Graefe's Arch., 1936, v. 136, p. 92.

By observation with X rays the epithelial layer and stroma of the cornea show characteristic interference pictures which tell of their specific crystalline structure. Through observation with polarized light in sections, it can be noted that the micellae in both sections are distributed in different densities according to anatomic direction. The definite position of the refractive-index ellipsoid shows that the micellae of the cornea in general are distributed in greater density in the sagittal direction than at right angles to this. The latter fact facilitates further passage posteriorly of light introduced sagittally into the cornea.

H. D. Lamb.

## 4

## OCULAR MOVEMENTS

Bressler, J. L. **Orthoptic treatment of strabismus.** Amer. Jour. Ophth., 1936, v. 19, Nov., pp. 989-992.

Bressler, J. L. **Treatment of strabismus, influence of orthoptic training on results of operation.** Arch. of Ophth., 1936, v. 16, Sept., pp. 433-442; also Trans. Sec. on Ophth. Amer. Med. Assoc., 1936, 87th annual meeting.

This report is based on 218 cases of strabismus divided into three groups: (1) those corrected by surgery alone, (2) by surgery followed by orthoptics, and (3) by surgery preceded and followed by orthoptics. In group one, spontaneous fusion developed in very few cases. In group two, after orthoptics parallelism increased from 6 to 47 percent and fusion from 9 to 75 percent. In group three, 56 percent showed parallelism and 81 percent had fusion. The value of orthoptic treatment before and after operation is clearly demonstrated. (Discussion.)

J. Hewitt Judd.

De Jaeger, Antoine. **A case of paralysis of the branch of the lower division, and a case of paralysis of a lesser branch of the upper division of the oculomotor nerve.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 37.

The author reports two cases, both of traumatic origin and both ending in recovery. In one X ray showed a fracture of the orbital plate, putting the orbit into communication with the maxillary sinus, and causing emphysema of the orbital tissue with consequent pressure on a branch of the superior division of the common oculomotor nerve. The resulting diplopia had almost disappeared by the end of two months. The article is illustrated by three X-ray photographs.

Jerome B. Thomas.

Dupuy-Dutemps, Pierre. **Traumatic paralysis of the sixth nerves.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 444-446.

After an automobile accident a man

of 36 years developed paralysis of both sixth nerves. After five months there was complete recovery. It is thought that the lesion was caused by direct trauma to the nerve.

P. J. Leinfelder.

Filippi-Gabardi, Eugenio. **Paralysis of associated vertical movements of the eyeballs.** Saggi di Oft., 1934-36, v. 8. (See Amer. Jour. Ophth., 1935, v. 18, April, p. 386.)

Frieberg, T. **Results of treatment of strabismus amblyopia.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 63.

A follow-up study of seventeen cases shows that the improvement in vision obtained by treatment of amblyopic eyes held in those cases which had binocular vision; in other words in those cases in which the eye was being used. The improvement did not hold in eyes which because of lack of parallelism of the visual axes were not used for fixation.

Ray K. Daily.

Granström, K. O. **Convergent strabismus in monozygotic twins.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 72.

In each of four pairs of monozygotic twins one or both twins had convergent strabismus. The most interesting pair was one in which both twins had convergent strabismus but only one had anisometropia and amblyopia. This case proves to the author that the squinting tendency can be primary and determined genetically, while the amblyopia must be secondary to the squint.

Ray K. Daily.

Merrill, H. G. **Choice of a surgical procedure for strabismus.** Arch. of Ophth., 1936, v. 16, Oct., pp. 642-648; also Trans. Pacific Coast Oto-Ophth. Soc., 1936, 24th annual meeting.

Three cases are presented, illustrating the results obtained by tucking with advancement, and guarded partial tenotomy of the opposing muscle; by resection with advancement, and partial guarded tenotomy of the opposing muscle; and by the O'Connor cinch shortening, and recession of the opposing muscle. The first procedure is used in extreme cases where temporary disfigurement is not objectionable, the second in those wishing to avoid unnecessary temporary disfigurement, and the third in cases of moderate deviation.

J. Hewitt Judd.

Nordlow, W. **Changes in refraction and in the lateral excursions of the eyeball in children, and in spontaneously cured cases of strabismus.** Acta Ophth., 1935, v. 13, pts. 3-4, p. 311.

From a review of the literature and from the tabulated data of the author's material he concludes that in people with orthophoria the inward and outward rotations are equal. In convergent strabismus the inward rotations are greater for both eyes. The angle of deviation is explained by inward rotation of the eyeball, which causes a disturbance in the accommodation-convergence relation and in the lateral excursions. Convergent strabismus improves continuously from the seventh to the twentieth year, and in 31.6 percent of the author's cases there was spontaneous cure. With this process are associated gradual diminution in refraction and improvement in the relation of adduction to abduction. In the author's opinion the findings contraindicate early operation. Repeated checks of the refraction, of the angle of deviation, and of the lateral rotations are helpful in making a prognosis in each case.

Ray K. Daily.

Tillé. **A study in ocular nystagmus.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 448-454.

The author reports nine cases of spontaneous or induced ocular nystagmus in which he carried out detailed studies on the eyes and the labyrinth. He concludes that the condition is congenital, modified by certain visual and motor factors, and often associated with strabismus or poor vision. Although vestibular tests are normal, mental deficiency often accompanies.

P. J. Leinfelder.

Van der Hoefe, J., and Roelofs, C. O. **Concerning the action of the eye muscles.** Arch. f. Augenh., 1936, v. 110, Sept., p. 1.

Accepting Volkmann's data as a basis, and with the aid of a system of coördinates, the authors calculated the relative power each muscle uses in a synergic action in any of the various directions of gaze. Although there are great individual variations in the origin and insertion of a muscle and the rotation center is but a conventional point, the figures give a better understanding of the muscle action. Some of the deductions are as follows: Synergic action of three muscles in any given direction is always necessary. The superior rectus remains an adductor in every direction. The adduction power of the superior and inferior recti is strongest when the eye looks down and weakest when the eye looks up. The abduction effect of the superior oblique is strongest looking down and it changes to adduction looking upward. The adduction effect of the inferior oblique is strongest when the eye looks down and it changes to abduction when the eye looks upward. Both the external and internal recti retain always a very weak elevator action. For the external rectus this is strongest in abduction and weakest in adduction: for the internal rectus it is strongest in adduction and weakest in abduction. The torsion effect of the external rectus is directed outward when the eye looks down and inward in looking up: the torsion effect of the internal rectus is directed inward looking down and outward looking up.

R. Grunfeld.

Vannas, Mauno. **Heterophoria and depth perception.** Acta Ophth., 1935, v. 13, pts. 3-4, p. 181.

The author tested on a number of cases the effect of experimental heterophoria, induced by prisms in a trial case, on depth perception. The findings show that exophoria causes underestimation of distances, while in esophoria distances are overestimated. To check these laboratory tests with clinical data the author took from the Psycho-physiologic Institute five hundred case histories of candidates for the flying service. These were men with normal visual acuity. Of this number 214 had exophoria, 176 esophoria, and 110 orthophoria; the records of their tests for depth perception agreed with the author's experimental findings.

Ray K. Daily.

## 5

## CONJUNCTIVA

Blegvad, O. **Further investigations on tuberculosis of the conjunctiva.** Acta Ophth., 1936, v. 14, pts. 1-2, p. 200. (See Amer. Jour. Ophth., 1936, v. 19, Oct., p. 929.)

Busacca, Archimede. **Are the nodules obtained after inoculation of trachomatous material into the vitreous specific?** Ann. d'Ocul. 1936, v. 173, July, pp. 528-553.

Suspensions of material from trachomatous pannus were injected into the vitreous of the rabbit, hen, and guinea pig. Some of the material was filtered and some was treated with glycerin. Injections of normal uveal tissue suspended in glycerin were also made. The inoculations produced very inconstant results. The reactions varied from very slight perivascular infiltration to panophthalmitis with formation of endocular nodules. The glycerinated material produced the more severe reactions. Suspensions of normal material in glycerin produced marked reactions with formation of nodules, composed essentially of lymphocytes with a few giant cells containing phagocytized corpuscles. The histologic appearance of these nodules seemed to be identical with that of the nodules produced by Szily with intravitreous inoculation of material from eyes enucleated for sympathetic ophthalmia. The author has the impression that the formation of endocular nodules is merely a type of nonspecific response to irritation.

John C. Long.

Calogero, V. N. **Progressive cystic nevus of bulbar conjunctiva with eosinophilia.** Boll. d'Ocul., 1936, v. 15, July, pp. 799-809.

A boy twelve years old had shown a neoformation of whitish-pink color on the temporal side of the conjunctiva of the left eye. To histologic examina-

tion this appeared to be a cystic nevus. In discussing the presence of eosinophiles the writer views them as the expression of an irritative stimulus acting for a long time on the tumor. (Bibliography, 3 figures.)

M. Lombardo.

Clay, G. E., and Baird, J. M. **Restoration of the orbit and repair of conjunctival defects.** Jour. Amer. Med. Assoc., 1936, v. 107, Oct. 3, p. 1122. (See Section 13, Eyeball and Orbit.)

Courtis, Baudilio. **The occlusion treatment of gonorrheal ophthalmia.** Arch. de Oft. de Buenos Aires, 1936, v. 11, June, p. 333.

A treatment for gonorrheal ophthalmia, introduced and advocated by non-ophthalmologists, and consisting in the subcutaneous use of vaccines and occlusion of the eye for the express purpose of destroying the gonococci by prolonging the contact between them and the antibodies, is criticized as contrary to all accepted teaching and practice among ophthalmologists. The Argentine Ophthalmologic Society was asked to condemn it officially and a resolution to that effect was passed.

M. Davidson.

De Walsche, L. **A rare case of bilateral actinomycosis of the bulbar conjunctiva.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 81.

The patient, a child nine years old, had been treated for common blepharitis for a year with yellow precipitate of mercury before the nature of the disease was recognized. Examination of one incised nodule confirmed the diagnosis of mycotic granuloma. General and local treatment with potassium iodide caused the remaining lesions to disappear. (3 figures, 4 references.)

Jerome B. Thomas.

Dunnington, J. H., and Khorazo, Devorah. **Conjunctivitis due to fusospirochetal infection.** Arch. of Ophth., 1936, v. 16, Aug., pp. 252-254.

A girl aged twenty years had a conjunctivitis from which fusiform bacilli and spirochetes were isolated. Protracted treatment with copper sulphate and a one percent solution of silver nitrate had caused no improvement, but addition of applications of one percent solution of sodium perborate gave rapid improvement.

J. Hewitt Judd.

Galewska, Zofia. **Gonorrheal conjunctivitis in the material of the Pilsudski eye clinic.** Klinika Oczna, 1936, v. 14, pt. 2, p. 238.

A statistical study of 81 cases relative to age, sex, corneal complications, and the gonococcus complement-fixation reaction. The reaction was negative in new-born infants, which are apparently incapable of developing antibodies in their blood. In older children it becomes positive subsequent to the development of conjunctivitis. In adults it is usually positive at the beginning of the conjunctivitis because of the preceding infection in the genito-urinary tract. The prognosis is better in cases with a positive reaction, in which corneal complications are less frequent and milder.

Ray K. Daily.

Jacobson, Jacob. **Benzyl cinnamate in the treatment of trachoma and corneal opacities.** Arch. of Ophth., 1936, v. 16, Sept., pp. 400-404.

The use of this drug in 244 cases of trachoma resulted in slight improvement in 53 and marked improvement in 193. A few cases of leucoma of gonorrheal origin showed appreciable improvement. After such treatment of corneal opacities artificially produced in rabbits, seven out of ten showed resorption and in three there was only slight improvement. (Discussion.)

J. Hewitt Judd.

Kiewe, Paul. **Results in intraocular inoculation of trachoma.** Brit. Jour. Ophth., 1936, v. 20, Oct., pp. 576-585.

The author conducted experiments to clarify the question whether typical lymphoid follicles result from infection or merely represent a conjunctival reaction. He concludes that Szily's conception of "follicle building" or "germinal-center building" will have to be widened in order to establish the absolute specificity of the described findings

for trachoma. (6 photomicrographs, bibliography.) D. F. Harbridge.

Kreibig, Wilhelm. **Amyloid degeneration of the conjunctiva.** Zeit. f. Augenh., 1936, v. 90, Oct., p. 129.

Study of two case reports with histologic findings and a review of the literature reveals the fact that conjunctival amyloidosis is strictly a local disease. Change from local to general amyloid degeneration has never been observed. Amyloid represents precipitation of an abnormal protein from tissue fluids, and its localized appearance suggests that it must also have a local cause, but neither clinical nor anatomic studies have revealed this cause. Trachoma has occasionally been associated with it but in most cases was absent. A distinction between amyloid and hyaline degeneration cannot always be made, and no relationship seems to exist with plasmocytoma.

F. Herbert Haessler.

Lijo Pavia, J., Vasquez Ferro, M. A., and Galindez, J. **A keratoconjunctival phlyctenule in fibrocaseous tuberculosis.** Rev. Oto-Neuro-Oft., 1936, v. 11, Aug., p. 219.

Tuberculin injection gave no local eye reaction but the tuberculous etiology of the phlyctenule is not questioned. M. Davidson.

Van der Straeten and Appelmans. **Tuberculous conjunctivitis.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 15.

The authors report a case in a woman of 23 years. The differential diagnosis includes trachoma, chronic follicular conjunctivitis, and Parinaud's conjunctivitis. Tuberculosis was suggested by unilaterality and by hypertrophy of the preauricular, submaxillary, and sternocleido-mastoid glands on the same side. The diagnosis was verified by the finding of tubercle bacilli in the conjunctival tissue and by the positive reactions in inoculated guinea-pigs. There was marked local and general improvement under injections of methylic antigen. Radiotherapy is reserved for cases that fail to improve satisfactorily under such treatment. (15 references, 3 illustrations.) Jerome B. Thomas.

Wagner. **Transplantation of buccal mucous membrane in various affections of conjunctiva and cornea.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 232-239.

Very good and lasting results were obtained from using buccal mucous membrane transplants in trachomatous pannus. Three cases relapsed on account of increase of the conjunctival affection. The best results were obtained in thirty pterygium cases, most of which were recurrent. Implants in bulbar conjunctivitis due to heat or corrosion showed restoration of movement even in eyes gravely affected, and at least such vision as the state of the cornea permitted. Transplants prevented lid adhesions. Some cases showed that buccal mucous membrane could be used in such serious conditions as xerophthalmos, eczematous pannus, and pemphigus. G. D. Theobald.

## 6

### CORNEA AND SCLERA

Brown, A. L., and Pugh, Janet. **Effect of intraocular concentration of typhoid antibodies on experimental corneal ulcers, with a report of seven cases.** Arch. of Ophth., 1936, v. 16, Sept., pp. 476-493; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1936, 87th annual meeting.

Animal experimentation indicated that the ulcers produced in immunized animals advanced more slowly and left fainter scars than those in controls, and that aspiration of the aqueous definitely inhibited advance of the ulcer. Aspiration was therefore done in seven human cases after injection of typhoid vaccine, to increase the intraocular typhoid-antibody content. Satisfactory results were obtained in every case. Three are reported in detail. (Discussion.)

J. Hewitt Judd.

Busacca, Archimede. **Partial funnel detachment of Descemet's membrane.** Arch. d'Opht., 1936, v. 53, Sept., p. 694.

A workman aged thirty years had

bilateral corneal leucoma, the result of conjunctivitis neonatorum. Optical iridectomy had been performed on both eyes at the age of ten years. Biomicroscopic examination of the right eye showed in the pupillary area a funnel-shaped structure attached to the cornea by its base and to the lens by its apex. It was first thought to be an inflammatory membrane, but on close inspection the endothelial mirror reflex could be made out in its folds, indicating that it was Descemet's membrane and the endothelium, detached as the result of a perforating ulcer and adhesion of Descemet's membrane to the lens. (Illustrated.) Derrick Vail.

Haldimann, Carl. **Parenchymatous keratitis in congenital syphilis of the second degeneration.** Zeit. f. Augenh., 1936, v. 90, Oct., p. 146.

Recently in the Bern clinic were observed two cases of parenchymatous keratitis in which history and physical findings were such that one could with a fair degree of confidence make a diagnosis of congenital lues of the second generation. Of seven unquestioned cases in the literature, five had parenchymatous keratitis, one chorioretinitis, and one Argyll Robertson pupil—in short, no changes which are not also observed in congenital lues of the first generation. The scarcity of recorded observations makes further publication desirable. F. Herbert Haessler.

Harrison, W. J. **Primary zonular opacity of the cornea.** Arch. of Ophth., 1936, v. 16, Sept., pp. 469-471.

A man aged 58 years had a zonular opacity in each eye. He had worked for thirteen years as a hatter, separating the hair from the fur of rabbit pelts by means of a blower containing mercury vapor. It was thought that the corneal opacities resulted from a fine deposit of mercury. The condition is clearly shown in a photograph.

J. Hewitt Judd.

Jablonska, Zafia. **Traumatic cyst of the sclera.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 378.

An infant aged nine months was pecked in the left eye by a chicken. The perforation in the lower portion of the sclera was covered with a Kuhnt flap. Two months later the child returned with a cyst in the lower portion of the sclera, with inclusion of iris in the cyst wall. The child had just recovered from an attack of whooping cough. Excision of cyst and iris was followed by glaucoma, which yielded to an iridectomy in the upper portion of the iris. The author believes that the cough was responsible for splitting the sclera by pressure of the prolapsed iris. (Illustrations.) Ray K. Daily.

Kraupa, E. **Megalocornea.** Zeit. f. Augenh., 1936, v. 90, Oct., p. 192.

Megalocornea was first described by Hasner in 1860, not, as generally believed, by Horner in 1882. Kraupa quotes Hasner's original description as published in Klinische Vorträge über Augenheilkunde, series 1, vol. 13, 1860.

F. Herbert Haessler.

Lazarescu, Dumitru. **Facts resulting from 349 observations of congenital syphilitic keratitis.** Arch. d'Opht., 1936, v. 53, Oct., p. 756.

The author draws the following conclusions from his observations: (1) The most frequent visible signs of congenital syphilis are lesions of the bone (38.35 percent), Hutchinson teeth (36.67 percent), complete triad of Hutchinson (6.27 percent), saddle nose (6 percent), deafness (6 percent). (2) Antisyphilitic treatment most often (87.61 percent) prevents the appearance of parenchymatous keratitis in the second eye, and in the few cases in which it does not prevent it retards such development. (3) Traumatism can provoke parenchymatous keratitis, which remains limited to the traumatized eye in a congenital luetic. (Illustrations, tables, bibliography.) Derrick Vail.

Pajtas, Jozo. **Corneal herpes.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 257-265. (See Amer. Jour. Ophth., 1936, v. 19, Aug., p. 729.)

Pajtas, Jozo. **Corneal herpes and trauma.** Ceskoslovenska Ofth., 1935, v.

2, no. 4, pp. 267-270. (See Amer. Jour. Ophth., 1936, v. 19, Aug., p. 729.)

Pajtas, Jozo. **Recurrent corneal herpes from vaccine A (Ponndorf).** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 271-276. (See Amer. Jour. Ophth., 1935, v. 18, Dec., p. 1168.)

Potvin, A. **Ocular manifestations in Quincke's edema and in urticaria.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 68.

As to etiology there are two varieties of urticaria; one due to a sensitivity to substances absorbed from the digestive or respiratory tracts (foods, pollens, drugs), and the other variety due to sensitivity to general agents such as heat, cold, and emotion. The author reports a case illustrating the latter variety. A woman of 36 years had eczema at intervals for eight years, when abruptly vitiligo took its place. At the age of 29 years the least change in temperature or the least emotional reaction brought on asthma and itching plaques of edema of the body and face. Four years later the edema localized itself in the eyes. The lids became tense and pearly white, the globes white and dry, and the corneas threw off large epithelial pellicles. At the time of the urticarial crisis the substances excreted in the conjunctival culs-de-sac were found to contain eosinophilic monocytes. Treatment was futile until ionization with histamine was undertaken. Applications every two days, with an intensity of 6 to 8 ma. for six to eight minutes, caused marked regression of symptoms in six weeks. The same therapy has given the author the same favorable results in two cases of superficial keratitis. May this not be considered as a larval form of urticarial keratitis? (12 references.)

Jerome B. Thomas.

Vejvodsky, V. **Inflammation after corneal injection of BCG vaccine in rabbits.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 277-279.

When BCG vaccine is injected into a rabbit's cornea, the course is almost like that after injection of virulent tubercle bacilli, but distinctly slower. Nodules form. There may be absorption or cicatricial healing, but no destruction of tissue. Only the very nearest adjacent areas react with irritation and secretion in the conjunctiva. There is hyperemia, but no real inflammation of the iris with formation of synechiae and exudate. The posterior parts of the eye remain intact. The inflammation is isolated in the cornea, and when it heals the affection ends. Rabbits have been watched four or five years, at autopsy tubercles could be found in any part of the animal. G. D. Theobald.

## 7

### UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Badot, J. **Real and false panophthalmias.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 85.

The distinction is made between metastatic panophthalmia and direct infections of the globe by way of operative or traumatic wounds. Five case histories are presented. (6 references.)

Jerome B. Thomas.

Senà, J. A. **Congenital multiple pigmented cysts of the iris.** Arch. de Oft. de Buenos Airies, 1936, v. ll, Aug., p. 461.

A modified classification of iris cysts into traumatic, parasitic, and spontaneous is suggested. Both acquired and congenital are included under spontaneous because of the difficulty of distinguishing them clinically. Anatomic-etiologic classification of the spontaneous into anterior, posterior, and intra-epithelial is also suggested. While the anterior cysts are in the stroma, and the posterior cysts are formed by adhesions between iris and ciliary processes, the intra-epithelial are between the strata of the pigment layer and are analogous to cystic degeneration at the ora serrata. A bilateral case in a girl of twelve years is reported and illustrated. M. Davidson.

Zentmayer, William. **A case of hyperplasia of the epithelium of the ciliary processes (ciliary adenoma of E. Treacher Collins).** Arch. of Ophth.,

1936, v. 16, Oct., pp. 677-680; also Trans. Amer. Ophth. Soc., 1936, v. 34.

A woman aged 56 years presented an area of brownish pigment, less than a millimeter across, in the iris at the angle of the anterior chamber and involving the outer circle of the iris. A diagnosis of probable sarcoma of the ciliary body was made and the eye enucleated. Microscopic examination revealed an adenoma of unusual size, arising in a ciliary process. In only one case previously reported had the growth been diagnosed clinically. (Photomicrographs.)

J. Hewitt Judd.

## 8

## GLAUCOMA AND OCULAR TENSION

Archanghelsky, P. F. **A spatula forceps for Heine's (cyclodialysis) operation.** Arch. d'Opht., 1936, v. 53, Sept., p. 697.

The author describes a forceps copied from De Wecker's scissors with the exception that flat spatula blades replace the scissor blades. The forceps is introduced into the scleral incision and the blades spread apart. It penetrates easily into the anterior chamber, avoids the lateral movements of the ordinary spatula, and simplifies and accelerates Heine's operation. (Illustrations.)

Derrick Vail.

Fox, S. A. **Postoperative glaucoma.** Arch. of Ophth., 1936, v. 16, Oct., pp. 585-608.

The literature is reviewed and 24 cases are reported which developed among 1,182 cases of extracapsular extraction of cataract and 447 discissions at Bellevue Hospital; 14 following extraction and 10 following discission. The incidence of 1.5 percent is approximately that of other authors. Evidence points to obstruction of the filtration angle as the ultimate cause of all postoperative glaucoma. Some responded promptly, but the general prognosis is poor, regardless of the type of treatment.

J. Hewitt Judd.

Franta, Jiri. **Changes in intraocular tension in gradually increased external pressure.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 280-293.

When a pressure of 200 to 250 gr. is applied externally to the normal eye for ten minutes, the intraocular tension becomes 0; it rises in a short time to 20 mm. and then to 30 mm. Hg; then quickly returns to normal. There may be a second or even a third similar reaction. In glaucoma, tension rises quickly after only slight pressure. In detached retina, the tension becomes 0 quickly, and slowly returns to its starting point. The curve of tension in the other eye follows the one directly affected.

In normal young eyes, the curve of the rise in tension followed the applied weight; weight 30 to 40 gr., tension 35 to 41 mm. Hg. In normal eyes of old age the relation of weight and tension was not always so regular. After using eserin and pilocarpin, a tension of 76 mm. resulted from a pressure weight of 90 gr. In glaucoma the eyes reacted similarly to normal ones. In eyes with detached retina, where the tension was low or minus, a weight of 70 gr. brought the tension of 35 mm. Hg.

G. D. Theobald.

Hynie, Jiri. **Doryl and glaucit, new glaucoma remedies.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 245-250.

Doryl (karbaminoylocholinchlorid) is a miotic which lowers the tension of glaucomatous eyes more quickly, more powerfully, and in a shorter time than previously used miotics. Glaucit (Heisler) introduces adrenalin in ointment form, with or without pilocarpin. Its chief use is in secondary glaucoma, where its action is probably helped by the 0.25 percent cocaine content of the ointment.

G. D. Theobald.

Weekers, L., and Fanchamps, J. **Contribution to the clinical study of consensual ophthalmotonic reactions.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 43. (See Amer. Jour. Ophth., 1936, v. 19, Nov., p. 1028.)

Weingott, Lucien. **Pathogenesis, etiology, and treatment of glaucomatous iridocyclitis.** Arch. d'Opht., 1936, v. 53, Sept., p. 672.

The author discusses the various theories as to the causes and pathogenesis of ocular hypertension and describes three cases of gonorrheal iritis associated with alcoholism and syphilis as degenerative factors. Favorable results were obtained by gonococcus vaccine combined with local treatment. Miotics and surgical intervention are not justified by the author's experience. Derrick Vail.

Wheeler, J. M. **Iridectomy with cyclodialysis for reduction of ocular tension.** Arch. of Ophth., 1936, v. 16, Oct., pp. 569-577; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1936, 87th annual meeting.

This operation is recommended for the far-advanced cases which have not responded to more conservative treatment. A large conjunctival flap is dissected up, and a scleral incision 3 or 4 mm. long is made with a cataract or discission knife, 8 to 10 mm. from the limbus, slanting slightly toward the iris. An angulated spatula is passed through the scleral incision, and the uvea separated by rotating the round handle of the spatula. Then a keratome incision is made at the limbus, under the conjunctival flap. Good traction is made on the iris with forceps and the scissors held close to the globe so as to cut off the iris at its attachment to the ciliary body. The steps of the operation are well shown by drawings. (Discussion.)

J. Hewitt Judd.

## 9

## CRYSTALLINE LENS

Bailliart, P., and Biernacka-Biesiekierska, J. **Development of cataract during the first pregnancy, in two generations.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 445.

A healthy woman 22 years old came to the clinic in the fourth month of pregnancy complaining of impairment of vision. She was found to have incipient cataract in the right eye. The family history revealed that the patient's mother had developed bilateral cataract during the latter's first pregnancy. The patient's cataract was progressive, and was removed after her delivery, with resulting normal vision. At this time the left lens was perfectly transparent. Six months later she had an incipient cataract of the left eye.

Ray K. Daily.

Horner, W. D. **Cataract following dinitrophenol treatment for obesity.** Arch. of Ophth., 1936, v. 16, Sept., pp. 447-461; also Trans. Sec. of Ophth., Amer. Med. Assoc., 1936, 87th annual meeting.

The history of the introduction and use of this drug is outlined and the literature is reviewed. The changes in the lens are described as subcapsular opacities which, however, cannot be considered pathognomonic of cataract caused by dinitrophenol. Medical treatment is useless, but of seventeen extractions by three different methods vision of 0.8 or better was obtained in fourteen. (Discussion.)

J. Hewitt Judd.

Kadlicky, R. **Can one recognize from the appearance of the cataract the possibility of success of intracapsular cataract extraction?** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 225-229.

The author reports two hundred cataract operations, in all of which he tried intracapsular extraction. According to appearance he classified the cataracts in five groups: intumescent, 17 percent; almost mature, 16.5 percent; immature, 33.5 percent; mature, 29 percent; nuclear, 31.5 percent; hypermature, 6 percent. Intracapsular extraction was successful in 73 percent. There were two causes for failure: (1) the capsule could not be grasped with the forceps; (2) the capsule was weaker than the zonule, and so was torn. Failures occurred in all groups, for different reasons. The largest number was among the intumescent (66.6 percent) and hypermature (66.7 percent) where the forceps did not take hold. The capsule was weak and so was torn mostly (30 percent) in the almost mature group; less often in the nuclear group (11 percent) and the mature (10 percent). The author concludes that from the appearance of the cataract the

result of intracapsular extraction cannot be prognosticated. By seizing the capsule from below the number of ruptures may be reduced but not entirely prevented. G. D. Theobald.

Knapp, Arnold. **Certain aspects of the intracapsular extraction of cataract by forceps: indications and technique.** Arch. of Ophth., 1936, v. 16, Sept., pp. 419-424.

The author points out that there is a general unanimity of opinion among the various authors in regard to the indications for intracapsular extraction. Improvements in technique have made it applicable to every case of senile cataract. The advantages of tumbling the lens are pointed out.

J. Hewitt Judd.

Moehle, Walter. **Cataract extraction through a vertical conjunctival slit.** Arch. of Ophth., 1936, v. 16, Oct., pp. 659-662.

A vertical conjunctival incision is made from the cul-de-sac to the limbus, the conjunctiva undermined to the horizontal meridian, and the two halves of conjunctiva separated by silk traction sutures. A keratome incision is made and is enlarged with scissors if necessary. Iridectomy and expression of the lens are performed in the usual manner. The conjunctiva may be sutured if desired, but this is deèmed unnecessary as the conjunctiva immediately lies smooth and flat with the edges of the incised wound in close approximation. The operative steps are illustrated by drawings.

J. Hewitt Judd.

O'Brien, C. S. **Further observations on detachment of the choroid after cataract extraction.** Arch. of Ophth., 1936, v. 16, Oct., pp. 655-656; also Trans. Amer. Ophth. Soc., 1936, v. 36.

Of 140 consecutive cases of cataract extraction, the fundus was viewed in 92, and 86, or 93 percent, of these presented detachment of the choroid.

J. Hewitt Judd.

Stastnik, Emanuel. **Intracapsular extraction in diabetic cataract.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 239-241.

Of six cases of diabetic cataract the intracapsular operation was successful in five. In one case the capsule broke, and an extracapsular operation resulted. The wound was open for a long time, healing was slow, and marked astigmatism resulted. The author prefers a large conjunctival flap with peripheral corneal incision, and a deep peripheral iridectomy with pupillary bridge including the sphincter.

G. D. Theobald.

Stastnik, Emanuel. **Method of operating morgagnian cataracts.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 241-243.

Of thirteen cases, the author performed extracapsular cataract extraction in four, intracapsular with conjunctival flap in four, and the Smith intracapsular with corneal incision in five. He had best results with the Smith method. G. D. Theobald.

Van Lint. **Subepithelial disseminated cataract of Vogt, of traumatic origin.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 62.

This type of cataract is characterized by multiple white spots located under the anterior capsule. It was described by Vogt in 1923 as occurring after iridectomy for glaucoma. The spots never become larger or more numerous but generally they persist. The writer reports a case following ulceration of the cornea due to acid burns.

Jerome B. Thomas.

## 10

### RETINA AND VITREOUS

Coppez, Léon. **Consideration of one hundred cases of retinal detachment operated by the method of pyrometric diathermocoagulation.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 53.

To surface coagulation with the aid of the pyrometric electrode the author has added other surgical procedures such as evacuating puncture, incision of the sclera, and thermocautery according to Gonin. Of 93 cases, the final results are tabulated as follows: cases perfectly

cured, 31; cured without macular vision, 14; cured without macular vision after a relapse, although cured the first time, 2; not cured, 41; not finally cured after having one or more relapses, 5; total cures, 47; failures, 46. The author insists that if one performs surface coagulation the laws which control high frequency currents require use of a pyrometric electrode. If one does not possess thermic control, simple diathermic micropunctures are recommended, perforating or not. Better still are very fine galvanocauterizations performed in two stages according to the method of Veil, and always under ophthalmoscopic control.

Jerome B. Thomas.

François, Jules. **Macular degeneration through sclerosis of the choroidal network.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 74.

In two cases sclerosis of the choroidal vessels affected the macular region exclusively. The patients were 60 and 85 years old. The vascular origin of the affection was supported by relative or real hypotension of the retinal artery and increase of its flexibility, uremia, and general arteriosclerosis. The best therapeutic agent is acetylcholine, an active dilator of the arterioles. Its efficacy is a new argument in favor of the purely vascular origin of the affection. (Three illustrations.)

Jerome B. Thomas.

Gifford, S. R. **Surgical treatment of retinal detachment.** Arch. of Ophth., 1936, v. 16, Sept., pp. 405-418.

The various operative procedures are reviewed. The author outlines his present technique with Walker's micropins and summarizes the results in 33 cases. Of the entire series 48.5 percent were healed. Of 24 seen in the favorable period, 13, or 54 percent, were healed. Three good results were obtained in aphakic eyes. Of the 33 eyes, six required a second operation, which was successful in only two. The author stresses the importance of looking for a hole in the upper half when a detachment is present below.

J. Hewitt Judd.

Karsch, Johannes. **Critical review of therapeutic attempts to influence the course of retinitis pigmentosa, 1877-1935.** Zeit. f. Augenh., 1936, v. 90, Oct., p. 157.

All manner of therapeutic procedures have been tried in retinitis pigmentosa. The reports are divided by the author into five groups, namely, general therapy with drugs having effect on vessels, topical applications to the eye, surgery, radiation, and hormone therapy and vitamins. None has given the hoped-for relief. In the reports one finds no considerable series with a definite program of objective examination as contrasted with the subjective statement of the patient.

Retinitis pigmentosa does not seem to be an entity with uniform pathogenesis, and it may be associated with other disorders. In judging therapeutic results, one must take into account great diurnal variations and the occurrence of transient remissions. Though Wibout's menform therapy has brought about no lasting improvement, the present author suggests that endocrine therapy may be worthy of study. Important as it was to try sympathectomy in larger series, it is now finally clear that this therapy, with its production of Horner's syndrome, is not sufficiently effective to warrant farther trial. The Japanese work with roentgen therapy is encouraging and should be repeated.

F. Herbert Haessler.

Knobloch, Rudolph. **Roentgen therapy in Lindau-Hippel disease.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 308-313.

The author describes a case affecting both eyes and the pancreas in a 38-year-old female. The patient's mother and two sisters had died with brain tumors. X-ray therapy, used over a period of two years, had no effect on the progress of the disease.

G. D. Theobald.

Krause, A. C. **Chemistry of the retina. 3, Autolysis.** Arch. of Ophth., 1936, v. 16, Sept., pp. 425-432.

Autolysis results from the action of enzymes naturally present in the tissues. It is inhibited in alkaline tissue,

but present experiments show that a large chemical change takes place as the acidity is increased. The author discusses the effect of leucocytes, infection, and cellular proliferation in connection with heterolysis and autolysis.

J. Hewitt Judd.

Sobanski, Januz. **Ocular decompression in the treatment of retinitis pigmentosa.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 358.

By ocular decompression the author means reduction of intraocular tension combined with internal medication increasing the general blood pressure. He tried this treatment in nine cases of retinitis pigmentosa, using cyclodialysis and giving strychnine and glandular extracts internally. In seven of the nine cases there was improvement in central and peripheral vision. In three the improvement was temporary. The author believes that the low diastolic retinal tension which he found in most cases of retinitis pigmentosa played an important part in the pathogenesis of the disease. Ray K. Daily.

Sobel, D. **A rare case of opticochoroidal vein.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 430.

In this case the lower nasal retinal vein of the left eye penetrated the retina at the border of the optic disc and disappeared into the choroid. (Illustrations.) Ray K. Daily.

Victoria, M., and Lijo, Pavia, J. **The adiposogenital syndrome and retinal changes.** Rev. Oto-Neuro-Oft., 1936, v. 11, Aug., p. 211.

In a preliminary communication, with report of two cases, the authors call attention to evidence of pigmentary degeneration of the retina in the Lawrence-Moon-Biedl syndrome.

M. Davidson.

## 11

### OPTIC NERVE AND TOXIC AMBLYOPIAS

Cockayne, E. A. **The inheritance of opaque nerve fibers in the retina (papilla leporina).** Brit. Jour. Ophth., 1936, v. 20, Oct., p. 569-575.

Of four generations the eyes of the first and fourth showed no evidence of the condition, while in the second there were two and in the third eight. Six were unilateral and four bilateral; five males and five females; none showed evidence of neurofibromatosis. A female may be normal yet transmit the anomaly. Medullation usually stops at the lamina but it may commence independently in the retina at one quadrant of the disc and spread out along the course of the blood vessels. The defect causes no symptoms except that there may be an enlargement of the blind spot. One table demonstrates the defect through four generations. (Bibliography, 14 references.)

D. F. Harbridge.

Duggan, W. F. **Use of vasodilators in treatment of retrobulbar neuritis.** Arch. of Ophth., 1936, v. 16, Sept., pp. 380-399.

Nine cases of retrobulbar neuritis were treated by intravenous injections of sodium nitrite, with marked benefit in eight. There was improvement in vision and a decrease in the size or density of the scotoma. It is suggested that retrobulbar neuritis is primarily due to a vascular spasm and that this treatment may also be used in amblyopia due to thallium, optochin, lead, and quinine poisoning. J. Hewitt Judd.

Lauber, H. **Treatment of atrophy of the optic nerve.** Arch. of Ophth., 1936, v. 16, Oct., pp. 555-568.

Patients suffering with tabes who had signs of involvement of the optic nerve frequently showed periods of low blood pressure, and this is considered one of the chief factors in the production of optic atrophy. Since the blood pressure can not be satisfactorily increased at will, restoration of normal balance between intraocular tension and retinal blood pressure is produced by miotics or operation. Cyclodialysis was found to be the most satisfactory. The results in 33 cases of optic atrophy are shown by charts and four cases are reported in detail. In each an improvement of vision followed reduction of intraocular tension. J. Hewitt Judd.

Neuman, Leon. **Lead amaurosis.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 408.

A review of the literature and a report of a case of sudden amaurosis with negative ocular findings and symptoms of acute hydrocephalus, in a young worker in lead. Ray K. Daily.

Talbot, Graeme. **Pernicious anemia with retrobulbar neuritis.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 619-621.

In spite of favorable reaction to liver treatment in relation to the blood cells, the patient experienced progressive failure of vision. Without optic atrophy, one disc was slightly paler than the other. The pupils continued to react to light. The visual fields were full. There was a central relative scotoma suggestive of retrobulbar neuritis. The visual condition might rest upon demyelinization of the optic nerve. The lack of development of optic atrophy is probably due to the fact that there is little interference with the axis cylinders. (One table.) D. F. Harbridge.

## 12

### VISUAL TRACTS AND CENTERS

Fox, J., and German, W. **Macular vision following cerebral resection.** Arch. of Neur. and Psychiatry, 1936, v. 35, April, p. 808.

During the past few years, the authors have had opportunity to study the vision of patients after resection of a known cerebral area. They attempted to correlate the results thus obtained with the anatomic knowledge of the course and termination of the geniculocalcarine pathway. They describe six cases to show that the macular fibers in the inferior longitudinal fasciculus are not solely confined to a central bundle but have a widespread distribution throughout the fasciculus. It is suggested that a similar arrangement occurs in the calcarine area with some macular elements located as far forward as the anterior extremity of the striate area. These findings are not incompatible with location of a special macular bundle in the center of the radiation and a chief macular center at the occipital pole. The physiologic importance of central vision appears to justify such a widespread representation.

Theodore M. Shapira.

## 13

### EYEBALL AND ORBIT

Damel, C. S., and Adroguè, E. **The optic vesicle, colobomas of the ocular fundus, and other malformations.** Arch. de Oft. de Buenos Aires, 1936, v. ii, Aug., p. 473.

The subject is reviewed and illustrated. Atypical colobomas of the fundus, those not continuous with the papilla or not situated below, are explained best by the theory of a double ocular cleft. M. Davidson.

Galewska, Zafia. **Metastatic hypernephroma in the orbit.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 371.

The patient, a woman of 22 years, with an abdominal tumor which caused her no difficulty, came to the eye clinic with a tumor of the right orbit. Beginning with the frontal bone the metastasis infiltrated the entire orbit, and it rapidly recurred after removal. The patient died of orbital hemorrhage. (Illustrations.) Ray K. Daily.

Giri, D. V. **A retention cyst of unusual size, probably of Krause's gland, simulating angioma of the orbit.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 621-624.

Cases reported in the literature differ from the author's findings. The cyst in his case disappeared into the orbit and strikingly increased in size on bending the head forward. The patient was refracted in 1928, again in 1929, and in 1930, with no abnormalities noted. In 1931 he complained of a lump which "came and went" and which eversion of the upper lid did not reveal. The cyst excised in 1934 was a translucent oval body about 3 cm. long and 1.7 cm. broad. (3 photomicrographs, references.) D. F. Harbridge.

Goldstein, Isadore. **Operation for retention of an artificial eye after exenteration of the orbit.** Arch. of Ophth., 1936, v. 16, Sept., pp. 465-468.

The author describes a method in which the lids are split and lined with Thiersch grafts to form a sulcus into which an artificial eye can be fitted. (Drawings, photographs of a case.)

J. Hewitt Judd.

Hermans, René. **Phlegmon of the orbit following extraction of a tooth.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 66.

Orbital abscess followed extraction of the right upper wisdom tooth for painful caries. The author concludes that the abscess was caused by migration of pus from a focus of infection in the alveolar process. At the end of a month visual acuity had returned to normal and diplopia had disappeared.

Jerome B. Thomas.

Konowna, Janina. **A case of bilateral orbital phlegmon complicated with thrombosis of the cavernous sinus.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 405.

Six days subsequent to a peridental infection of a right upper molar tooth, a man of 53 years developed right orbital cellulitis, followed in three days by left orbital cellulitis and thrombosis of the right cavernous sinus. He died with symptoms of meningitis.

Ray K. Daily.

Langhammerova, Rosalie. **Osteomyelitis of the orbit.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 321-324.

The author describes a primary staphylococcic osteomyelitis of the temporal bone of the orbit in a twenty-year-old female. The process had begun a year earlier with acute orbital cellulitis. When the patient arrived at the clinic, there was a 2-by-2-mm. fistulous opening 0.5 cm. to the temporal side of the external canthus. After protein and X-ray therapy, sequestrotomy resulted in cure.

G. D. Theobald.

Mieses-Reif, Marjan. **Orbital cellulitis complicating paranasal sinusitis, and its treatment.** Klinika Oczna, 1936, v. 14, pt. 2, p. 213.

A review of the literature on the treatment of orbital cellulitis and a report of twelve cases treated conservatively with satisfactory results.

Ray K. Daily.

Pascheff, C. **Parasitic pseudotumors of the orbit.** Arch. d'Opht., 1936, v. 53, Sept., p. 657.

Parasites which affect the orbit present two types of pathologic process: (a) purely inflammatory, which ends in suppuration, (b) neoplastic, which results in pseudotumors. These are very rare and little known, and often cause diagnostic errors. The animal parasites (zoöparasites) are protozoal (syphilis), flat worms (cestodes, echinococcus of the orbit, cysticercus), and round worms (trichinosis, filaria). The vegetable parasites (phytoparasites) are bacterial (tubercle bacillus) and discomyces (streptoactinomyces). Case reports and pathologic descriptions illustrate the classification. (Illustrations, bibliography.)

Derrick Vail.

Stallard, H. B. **A case of "exophthalmic ophthalmoplegia with thyrotoxicosis."** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 612-619.

A case of bilateral exophthalmos is reported. The effects on the anterior lobe of three injections on successive days of 600 organon units of the thyrotropic hormone are discussed. Conclusions are: (1) This hormone readily produces exophthalmos in those who have had the thyroid removed or are subjects of hypothyroidism. (2) There is experimental evidence that some patients respond to this hormone by producing a substance which operates on the unstriped muscle of the orbit. (3) The degree of exophthalmos in the case reported might have been less in a normal control. (2 charts, references.)

D. F. Harbridge.

Wolfsohn-Jaffe, Else. **The differential diagnosis of orbital gumma.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 626-631.

The piezometer, an apparatus measuring the displaceability of the eyeball into the orbit, is suggested by the author as an auxiliary means of diagnosis of retrobulbar tumors of the orbit.

Its use in the course of gummatous affections is illustrated by one case history. (References.) D. F. Harbridge.

## 14

### EYELIDS AND LACRIMAL APPARATUS

Altenberger, Stanislaw. **The relation of trachomatous corneal complications to the function and anatomic aspect of the lacrimal glands.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 396.

The functional efficiency of the lacrimal glands was tested in 68 cases of trachoma in various stages, by the Schirmer method. The findings show a close relation between impairment of the function of the lacrimal gland and severe corneal complications. The gland functioned normally in trachoma of the lids with mild corneal complications. In severe corneal complications, even in the cicatricial and quiet stages of trachoma, the function of the lacrimal gland was found impaired. Microscopic studies of the lacrimal gland in four cases of impaired lacrimal function showed proliferation of its connective tissue and small cell infiltration. The author believes that a test of the function of the lacrimal gland will be helpful in making the prognosis in a case of trachoma, as well as in indicating therapeutic procedure. (Illustrations.)

Ray K. Daily.

Chorazycka-Weintalowa, A. **A nasal papilloma involving the nasal wall and the lacrimal sac.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 391.

A woman 63 years old had a neoplasm which filled the right half of the nose, involved the maxilla, and projected through the lacrimal puncta. The biopsy report showed papilloma, with suspicion of carcinoma. The patient refused operation. (Illustrations.)

Ray K. Daily.

Goldberger, Emanuel. **Epicanthus and its variants among Caucasians.** Arch. of Ophth., 1936, v. 16, Sept., pp. 506-515.

The literature is reviewed and epicanthus is classified into supraciliary, palpebral, tarsal (three degrees), and inverse. In a series of 1,200 persons, 4 instances of first-degree, 16 of second degree, and 42 of third degree or residual epicanthus were observed. The most important etiologic factors are incomplete development of the bridge of the nose and deep insertion of the levator tendons. J. Hewitt Judd.

Malkin, Boris. **Treatment of angioma of the eyelid by injection of sclerosing solutions.** Arch. of Ophth., 1936, v. 16, Oct., pp. 578-584.

The author reviews the literature and reports three cases in which good results were obtained by injection of quinine and ethyl carbamate in one and quinine di-hydrochloride in two cases. (Photographs.) J. Hewitt Judd.

Melanowski, W. H. **A study of collyria.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 457.

A report of eight cases of chronic marginal blepharitis treated with Optreax, with excellent results.

Ray K. Daily.

Panneton, Philippe. **Blepharochalasis, in regard to 51 cases in the same family.** Arch. d'Opht., 1936, v. 53, Oct., p. 729.

Blepharochalasis was found in 51 individuals out of 79 in three generations. The hereditary tendency did not seem to follow Mendelian laws nor was it sex-linked. A complete review of the literature and discussion follow. (Illustrations, extensive bibliography.)

Derrick Vail.

Reimova, Milada. **Lysozyme content of tears.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 293-302.

The quantity of lysozyme in tears is not sufficient to cause immunity to infection. G. D. Theobald.

Vejdovsky, V. **A contribution to plastic surgery of the lacrimal canal.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 230-232.

Nine years ago a man had been injured by molten iron. He had a scar in the inner canthus of the left eye which involved the lids and caruncle. Both

upper and lower lacrimal ducts were completely blocked. The author implanted a new canal of buccal mucous membrane from beneath the position of the caruncle into the lacrimal sac. After ten months the duct was still patent, but on account of the deformity of the lids tearing continued. The lacrimal gland was therefore resected.

G. D. Theobald.

## 15

### TUMORS

Benedict, W. L. **Adenocarcinoma of the orbit.** Arch. of Ophth., 1936, v. 16, Oct., pp. 663-671; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1936, 87th annual meeting.

After reviewing the literature, the author reports 27 cases of adenocarcinoma of the orbit, in 22 of which it was primary and in 5 secondary by invasion. Of the primary tumors 13 were of the mixed-tumor type, 6 of the alveolar type and 3 miscellaneous. In none of the 27 cases was a generalized metastasis found. The alveolar type develops earlier in life, progresses more rapidly, and is more malignant than the mixed type. (Discussion.)

J. Hewitt Judd.

MacDonald, A. E. **Choroidal chorionepithelioma secondary to teratoma of the testicle.** Arch. of Ophth., 1936, v. 16, Oct., pp. 672-676.

This condition occurred in a young man who complained of a painless mass in the scrotum. Marked endocrine disturbance was present, as shown by some symptoms commonly classed as secondary manifestations of pregnancy. The eye was removed on account of rapid growth of the tumor, and the clinical diagnosis was confirmed by the findings at autopsy. (Photomicrographs.) J. Hewitt Judd.

Morgan, A. L. **Fibrosarcoma of eyelid, report of a case.** Arch. of Ophth., 1936, v. 16, Sept., pp. 472-475.

In a boy aged nine years swelling of the right lower lid simulated chronic conjunctivitis and blepharitis. After a conjunctival scraping the lid rapidly increased in size, and biopsy revealed a fibrosarcoma. There was no regional increase or metastasis two years after orbital exenteration. (Photograph, photomicrograph.) J. Hewitt Judd.

Newman, Jakob. **Melanoma of the iris with cysts in the pigment epithelium.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 383.

A patient 29 years of age with a melanosarcoma of the iris refused to have the eye enucleated, and the tumor was excised. Histologically it involved the parenchyma of the iris. The pigment epithelium contained many cysts, into some of which the tumor masses projected mushroom-like. The author believes the cyst formation was secondary to the tumor, developing in response to an inflammatory reaction caused by the neoplasm. The patient was not followed. (Illustrations.) Ray K. Daily.

Pexderova, R. **Metastatic seminoma in the eye.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 302-308.

A 37-year-old male had multiple metastases from a tumor of the left testis, which at the time of death was of the size of an egg. Shortly after the preauricular gland became involved, vision in the right eye grew dim. Metastases were found in the choroid adjacent to the disc, and in the retina.

G. D. Theobald.

Stastnik, Emanuel. **Retrobulbar angioma cured with radium.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 325-326.

A thirty-year-old female suffered for six years with intermittent exophthalmos of the left eye, accompanied by severe eye and head pains. It steadily became worse, so that she was unable to stoop over because the exophthalmos then became aggravated. She was treated with radium (3840 mgh.) over the temporal region from May, 1931, until June, 1933. Her condition became almost normal, without subjective difficulties, and with complete capacity to work. The vision of the eye was improved from 5/15 to 5/5. Myopic was changed to hyperopic astigmatism.

G. D. Theobald.

Terrien, F., and Veil, P. **Anatomoclinical study of a case of nevoid cancer of the caruncle.** Arch. d'Opht., 1936, v. 53, Oct., p. 721.

For several months prior to July, 1931, a woman aged 70 years had noticed a small reddish swelling the size of a pea situated in the inner canthus of the left eye. It was painless, hard, and non-adherent, and there was no regional adenitis. On July 28, 1931, the growth was easily excised under local anesthesia. Examination showed nevus cells without much pigment. There was no metaplasia, although there were a few cellular monstrosities. The tumor recurred several months later, and exenteration was refused. Radium was applied without success. Six months later, the tumor having involved the entire orbital contents subperiosteal exenteration was permitted. The examined specimen showed an alveolar (perithelial) architecture with melanophores. The patient died of spinal metastases a few months later. The case illustrates the futility of radium treatment and emphasizes that early exenteration of the orbit offers the only satisfactory prospect. (Illustrations.) Derrick Vail.

Wittels, Ludwik. **A case of symmetrical lymphadenoma of the transitional folds. The ocular changes in aleukemic lymphadenosis.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 415.

A review of the literature and a report of a case which demonstrates the transition of lymphadenosis into lymphosarcoma. A man 62 years of age came to the eye clinic with symmetrical tumors in all four transitional folds. The patient gave a history of lymphadenosis, having been treated four years for glandular enlargements and a tumor of the lingual tonsil. The growths in the upper transitional folds were excised, and the smaller tumors in the lower transitional folds disappeared under X ray. Microscopically the tumor was a lymphosarcoma. (Illustrations.)
Ray K. Daily.

Wostry, Milos. **Bilateral orbital chloroma.** Ceskoslovenska Ofth., 1935, v. 2, no. 4, pp. 313-320.

A three-year-old boy had a typical clinical history and blood picture of chloroma, confirmed by X ray and histological section. Some time before the child had received a blow on the head, and there were indications that this had provoked cranial periosteal infiltration. Arsenic therapy and X ray brought immediate but temporary results. The infiltration lessened, but another growth occurred, resulting in stasis of the retinal vessels of the right eye. The patient died of lobar pneumonia following measles, three months after onset of the chloroma. G. D. Theobald.

## 16

### INJURIES

Coppez, J.-H., and Brenta. **Ocular burns with sulphuric acid.** Bull. Soc. Belge d'Opht., 1936, no. 72, p. 88.

Two patients had severe burns of face and eyes followed by extensive destruction of skin and corneas. The third patient received a weaker concentration of the acid in one eye and suffered a corneal burn of the first degree from which he recovered with normal vision. The treatment consists in prompt and copious washing of the eyes with water, the heat developed by contact of water with the acid being negligible. Later treatment is symptomatic. Prognosis is always reserved. The authors favor the early use of grafts of mucous membrane from the lower lip according to the method of Denig, in order to limit the necrotic process. Neuman's recent experiments with hares demonstrated that the destructive process continued to penetrate the tissues for several days after the traumatism, but that this process was arrested if the necrotic part, which continued to act as corrosive to contiguous surfaces, was removed as soon as possible and replaced by a graft. The treatment of established symblepharon is considered briefly. (One figure, 14 references.)
Jerome B. Thomas.

Dopheide, E. **Magnet keratome, punch, and forceps.** Zeit. f. Augenh., 1936, v. 90, Oct., p. 193.

The author describes three attach-

ments for a magnet which he finds useful in extracting a foreign body from the anterior chamber after it has been brought thence by the giant magnet. The use of one of these three accessories, namely, magnetic keratome, sharp conical punch, and forceps, frequently prevents loss of the foreign body in the anterior chamber.

F. Herbert Haessler.

Grzedzielski, Jerzy. **Two eyelashes in the cornea.** Klinika Oczna, 1936, v. 14, pt. 2, p. 209.

Following a non-perforating corneal injury with a thin wire, leading to circumscribed keratitis with hypopyon, two eyelashes were found embedded in the corneal parenchyma. They were removed through corneal incisions.

Ray K. Daily.

Karbowski, Mieczyslaw. **The effect of colored light on the healing of corneal wounds in rabbits.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 433.

A study to determine the effect of red and blue light on the healing processes of experimental eye burns of the cornea of rabbits, and of experimental erosions of the corneal epithelium. The results show faster healing in red than in blue light. Ray K. Daily.

McDannald, C. E. **Multiple gold foreign bodies in the cornea.** Arch. of Ophth., 1936, v. 16, Sept., pp. 462-464.

Explosion of gold fulminate embedded fine metallic particles practically all over both corneas and in the nasal conjunctiva and the surrounding skin. Some were embedded beneath Bowman's membrane. Only a few superficial ones could be removed by curettage. After nine years there was a slight decrease in visual acuity in one eye from roughening of the epithelium, due to forward movement of the gold particles. The patient had suffered no discomfort. This case demonstrates the tolerance of the cornea to non-oxidizing foreign bodies. (Drawing, discussion.)

J. Hewitt Judd.

Okolov-Hrynklewiczowa, Z. **Ocular injuries in children.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 520.

A detailed analysis of the material of the ophthalmic clinic at Wilno relative to sex, age, season of the year, cause of injury, complications, results.

Ray K. Daily.

Reicher, Zofia. **A rare case of foreign body in the orbit.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 428.

In an auto accident a door handle perforated the lower left lid and was embedded in the muscles of the canine fossa without injuring the eyeball. Recovery was without complications, but there remained some limitation of movement of all external ocular muscles, which the author attributes to retrobulbar hemorrhage. (Illustrations.)

Ray K. Daily.

Savin, L. H. **Eyelash carried by a perforating injury into the posterior aqueous chamber and removed eleven weeks later.** Brit. Jour. Ophth., 1936, v. 20, Nov., pp. 609-612.

After citing cases of Ruete in 1839 and Manz in 1868, and a review by Wagenmann in 1921, the author describes his own unusual case. A rivet striking the eye carried a cilium into the posterior aqueous chamber. The condition was not suspected until operation eleven weeks after the accident, the injured eye not having responded to other treatment. (One photomicrograph, one diagram, references.)

D. F. Harbridge.

## 17

### SYSTEMIC DISEASES AND PARASITES

King, E. F. **The eye in leprosy.** Brit. Jour. Ophth., 1936, v. 20, Oct., pp. 561-569.

Of fourteen cases of leprosy ten showed eye involvement. The eye usually becomes involved late in the course of the disease. Thickening of the supraciliary ridge, loss of eyebrows, and diffuse infiltration of the lids, extending later through the tarsal plate, are characteristic early signs. While the fourth and sixth nerves seem to escape, the seventh and third are prone to be affected. Lacrimal gland involvement and

conjunctival anesthesia are usual. Punctate keratitis develops later. Gray spots or nodules frequently appear on the iris between the collarette and the ciliary zone. If retina and choroid are affected later, this is impossible of observation because of the scarring of the cornea. (5 illustrations, bibliography.)
D. F. Harbridge.

Kwaskowski, A., and Sluskowska, A. **Gout and the eye.** Klinika Oczna, 1936, v. 14, pt. 2, p. 196.

A review of the literature.
Ray K. Daily.

Mattos, B. **Intraocular lesions in subretinal cysticercus.** Rev. Oto-Neuro-Oft., 1936, v. 11, Sept., p. 235.

Observations on eleven cases of cysticercus are recorded with ten successful extractions including one with two parasites in one capsule. Very often there is little inflammatory reaction. Occasionally the reaction is so marked that a diagnosis of tuberculous, luetic, or focal uveitis is made. The parasite may migrate from one site to another, death in its capsule being a rarity. The old site may suggest a diagnosis of choroidal sarcoma by its vascularization and wrinkles. In order to limit the harm occasioned by the parasite pending its evolution and extraction, use of the galvanocautery to promote adhesive chorioretinitis is suggested.
M. Davidson.

Szymanski, Jan. **Syphilis of the eye demonstrated iconographically.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 291.

A postgraduate lecture on syphilis from the general as well as the ophthalmologic viewpoint, with numerous illustrations. In Poland there are born yearly about 25,000 children with congenital syphilis, of whom only one-fourth survive beyond early infancy.
Ray K. Daily.

## 18
## HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Biro, Emeric. **Contributions to the hereditary character of some ocular diseases.** Arch. d'Opht., 1936, v. 53, Sept., p. 685.

Cases and genealogic tables are cited regarding the hereditary aspects of (a) senile cataract, (b) congenital dislocation of the lens, (c) pigment degeneration of the retina, and, (d) congenital ptosis.
Derrick Vail.

Rodin, F. H. **Ophthalmologist, oculist, optician, and optometrist; the origin of these words in the English language.** Arch. of Ophth., 1936, v. 16, Oct., pp. 609-623; also Trans. Western Ophth. Soc., 1936, 3rd annual meeting.

The author traces and discusses the origin of these words. He proposes that for physicians specializing in diseases of the eye only the word "ophthalmologist" be used in medical and scientific literature and the term "eye physician" in the lay press.
J. Hewitt Judd.

Rostkowski, Ludwig. **The fight on blindness in Poland.** Klinika Oczna, 1936, v. 14, pt. 2, p. 262.

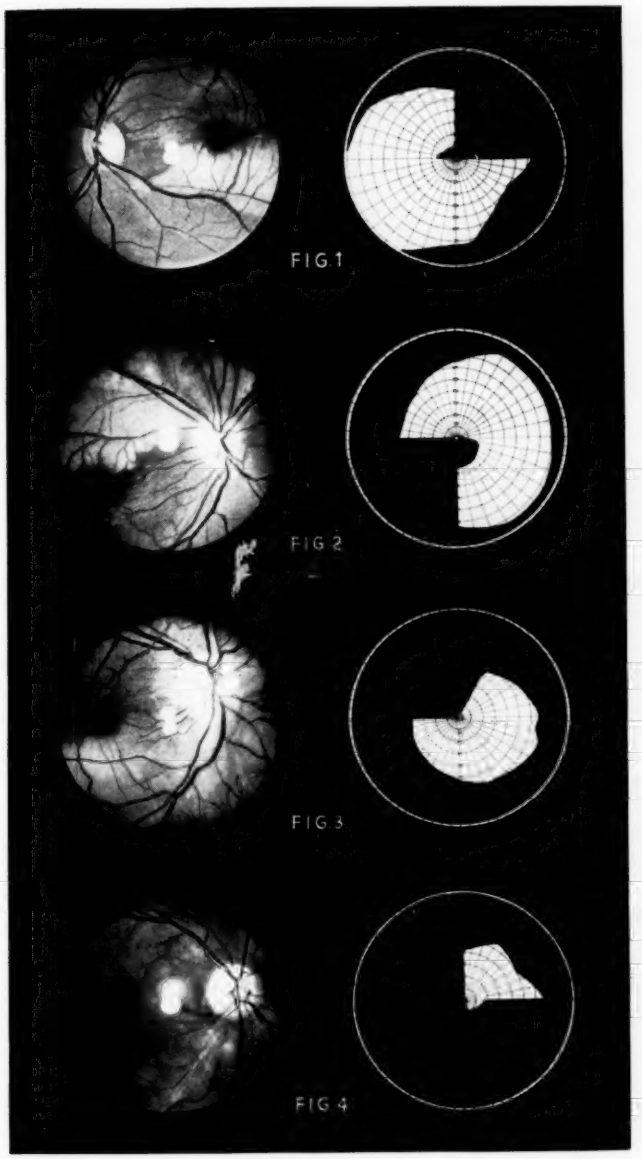
A statistical study of 444 blind and 226 one-eyed. The etiologic factor is traumatism in 14 percent, glaucoma 12.6, trachoma 7.1, methyl-alcohol poisoning 2, and acute infections 33.3 percent. The complete absence of ophthalmologic service in the rural districts and the poverty of the rural population force numbers of people to stay blind from cataract, or to go on to blindness with untreated glaucoma. The recommendations call for provision of some type of expert service for the rural population, and the introduction of preventive measures in the industry.
Ray K. Daily.

Sielicki, Bohdan. **The role of the school in the spread of trachoma.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 551.

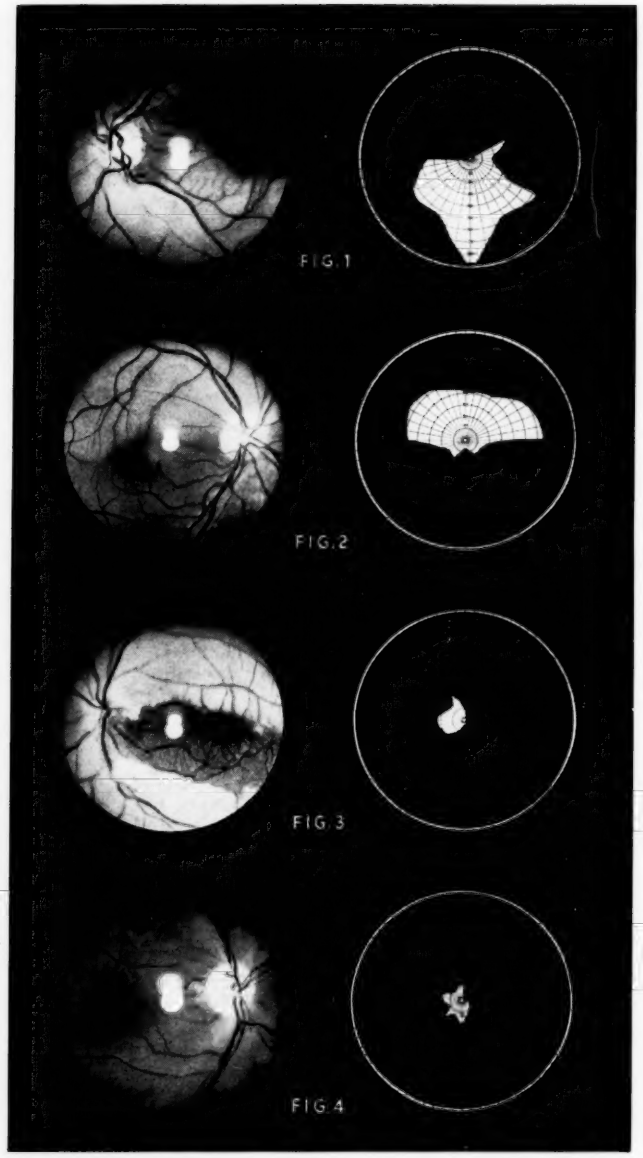
Five years of observation convince the author that children do not become infected at school.
Ray K. Daily.

Wieczorek, Antoni. **Hospitalization facilities for patients with ocular diseases in Poland.** Klinika Oczna, 1936, v. 14, pts. 3-4, p. 499.

A detailed survey of the ophthalmologic services in Poland, which shows that they are very inadequate.
Ray K. Daily.




FIGS. 1-4 (BEDELL). SUDDEN OCCLUSION OF THE RETINAL ARTERIES.




FIGS. 1-4 (BEDELL). SUDDEN OCCLUSION OF THE RETINAL ARTERIES.